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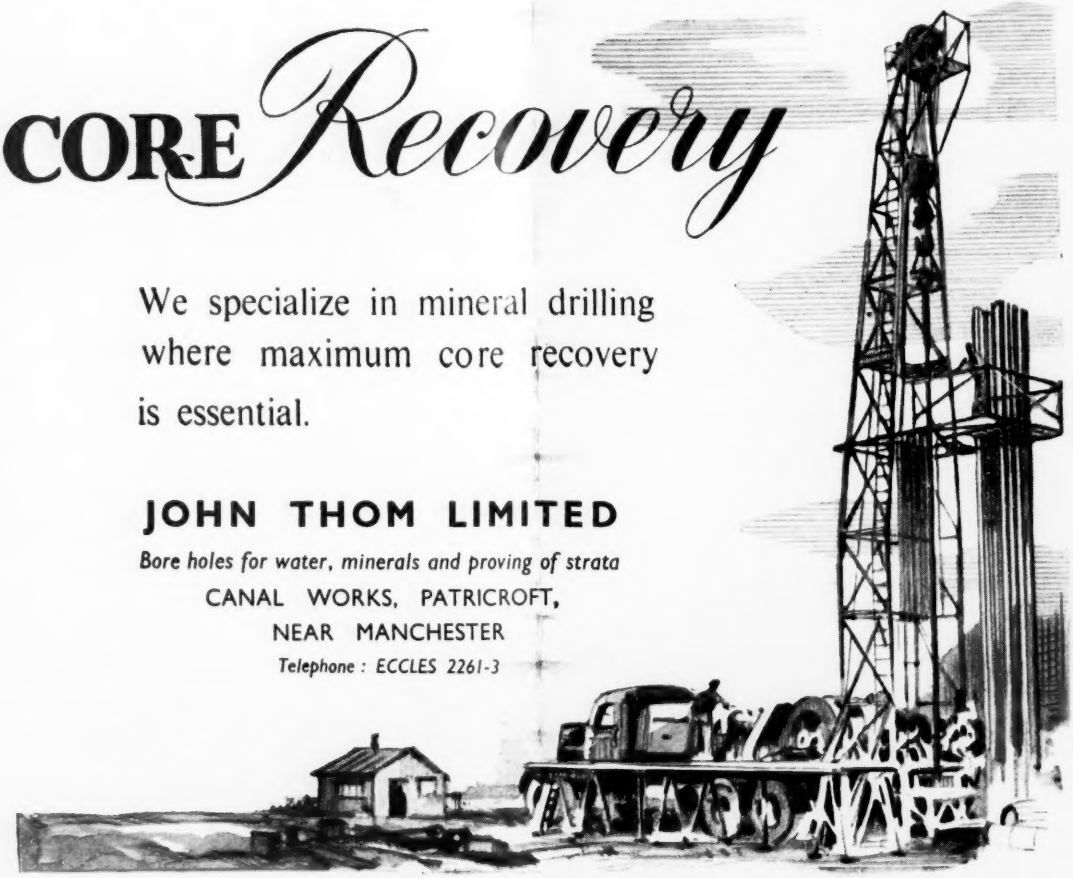
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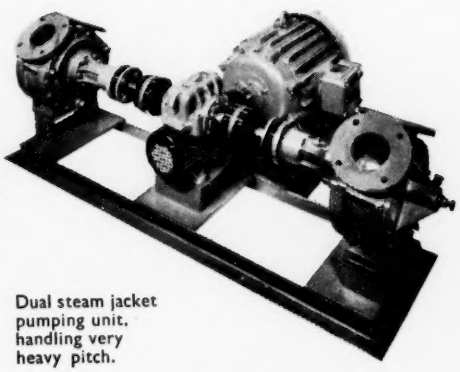
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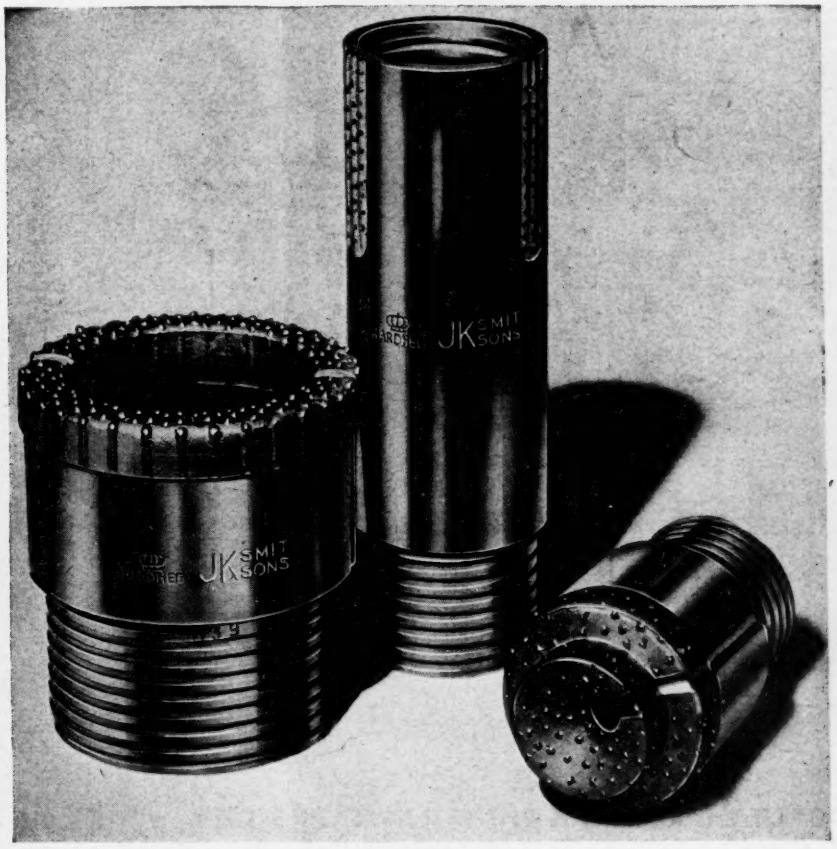


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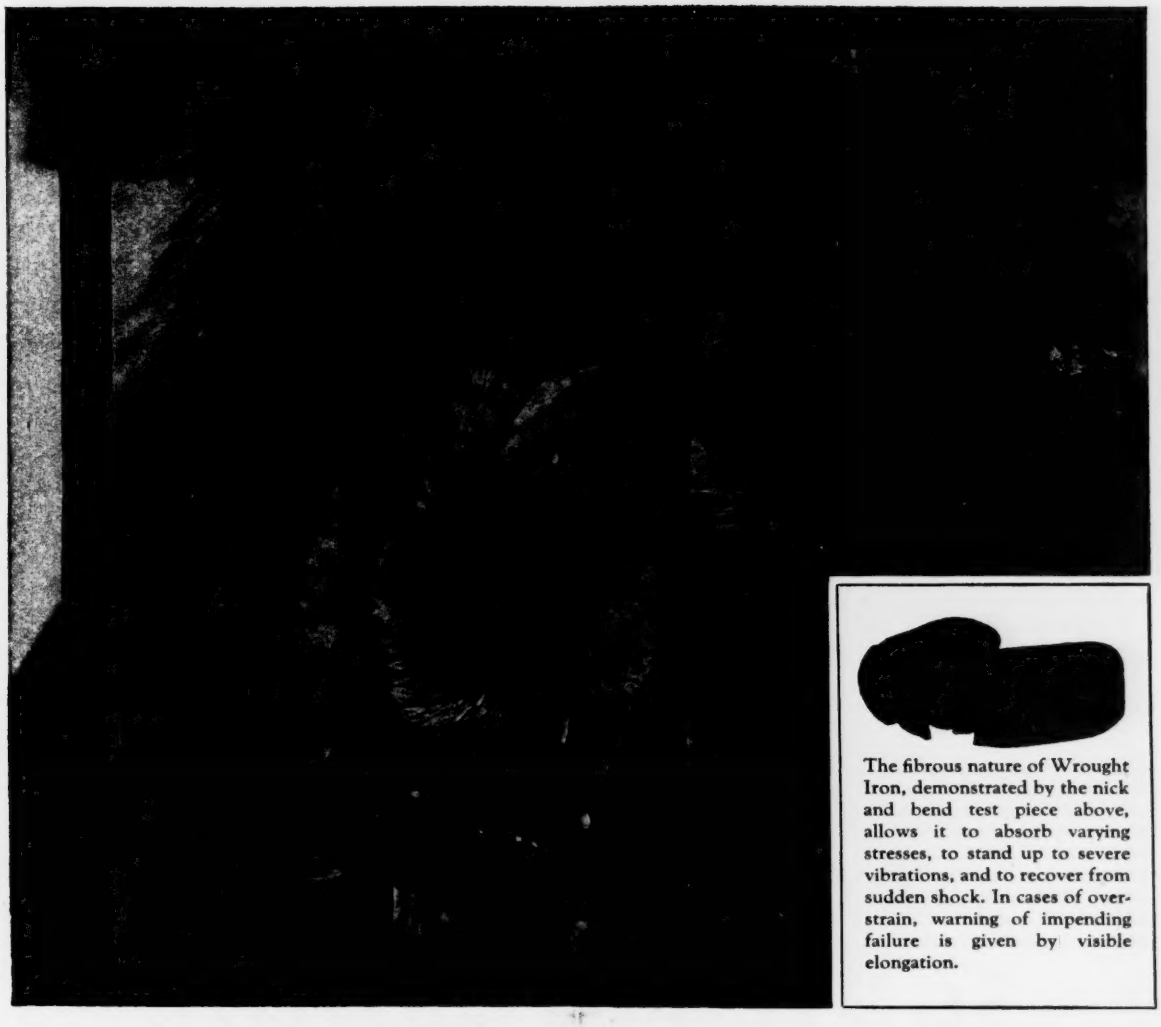
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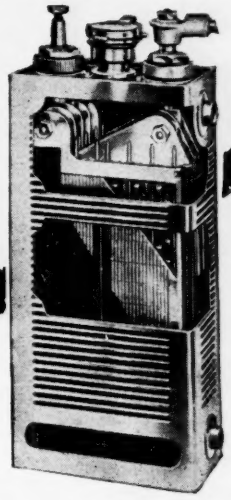

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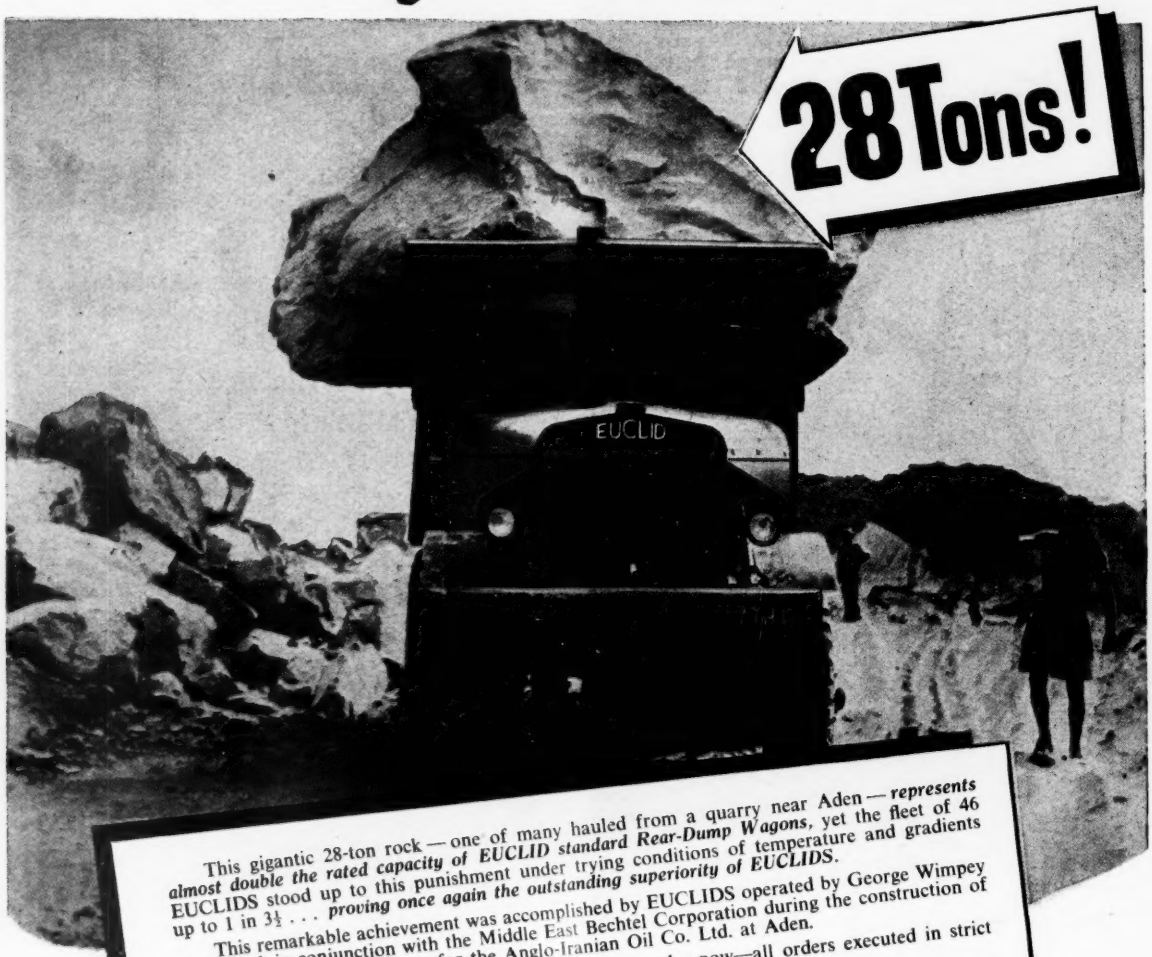
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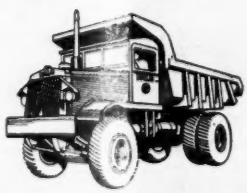
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The Mining Journal

Established 1835

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NOTES AND COMMENTS

How Much Steel?

How much steel will Britain need four or five years hence? Of course nobody knows. But to admit that any attempt to forecast industrial requirements may prove to be wide of the mark is not a repudiation of the responsibilities of economic planning. The British Iron and Steel Federation was far ahead of European industrialists in the preparation and implementation of a comprehensive post-war development plan. It was based upon expert advice, and was carefully vetted by the Government before final approval. Yet in the event the plan has proved to be inadequate.

We have experienced all the difficulties of a steel shortage and have had to pay dearly for marginal supplies imported from U.S.A., from Western Europe and more distant sources. That phase has now ended. At a moment when production and consumption of steel appear to be in a state of approximate equilibrium, it is not inappropriate that the probable needs of the future should be closely examined. In the national desire to avoid a recurrence of the steel famine of 1951-52 there is a risk of over investment in steel making capacity. Redundancy could be as great a danger as scarcity. The penalty for over expansion would be under employment of workers as well as of plant.

All the pros and cons of this question are intelligently surveyed in the current statistical bulletin of the B.I.S.F., which emphasizes the point that the demand for steel is so dependent upon broad economic trends and is so much influenced by Government decisions in the field of capital investment, and export policy, that estimates can hardly be made by the steel industry alone.

At every stage in the evolution of the industry's second post-war development plan there has been close consultation with the Government's economics experts, and the joint conclusion is that the target of an annual output of 20,000,000 tons of crude steel should be attained in 1957. That is a figure based on many bold assumptions, in regard to the continuance of full employment, the expansion of engineering exports and the maintenance of capital investment at a high level. It involves moreover a capital expenditure of £300,000,000 spread over a period of five years. But it is a flexible plan. If conditions alter so can the industry's investment programme be modified.

With these reservations the Federation presents a substantial case in favour of a continuance of the comprehensive plans for the further expansion and technical progress of this great national industry, and the economic effects of these plans, no less than the heavy initial costs will no doubt enter into the calculations of the private investors who will very shortly—possibly before the end of this month—be presented with the opportunity of acquiring a stake in the British steel industry.

Bolivian Tin Deposits

In a recent issue of *El Semenario Economico* published in La Paz, Sr. Eduardo Pérez Morales, Bolivian mining engineer, complains that the Americans only know of the Llallagua mines of the Patiño Mines Consolidated, and are unaware of other tin deposits which can be worked cheaply. Among those which could compete in price with Malaya and other countries, he says, the most important are the deposits of stream tin of Rodeo and the pegmatite deposits of Coscapa. The first named district is hampered by lack of water, supplies of which should be provided for the Chojñacota, Larancota, and Mallachuma mines, where the slopes could be worked with monitors. Various engineers have estimated that these deposits could yield 600,000 tonnes of fine tin at an estimated cost of 60 c. per lb. of fine metal.

Another important deposit is the pegmatitic formation in the neighbourhood of the Fabulosa and Milluni mines in the Zongo mining district—more particularly the Formidable, Fenominal and other properties. As the veins here are very narrow, opencast working is recommended on the lines of Chuquicamata with the declaration of the waters of the Rio Zongo as a public utility which could easily produce 50,000 kWa. A Spanish mining engineer has estimated that the area contains some 1,300,000 tons of fine tin which could be won at a maximum production cost of 70 c. per lb.

These projects would of course involve large investments of capital from government and private sources but the writer concludes that these two deposits alone contain some 2,000,000 tons of fine tin capable of being worked cheaply and promising an annual 40,000 tonnes for 50 years.

The Scope for Economic Nuclear Power

Owing to the fact that it is now technically feasible to construct nuclear electric power stations, the economic aspects of nuclear power generation for civilian purposes are assuming a growing significance. It was shown, however, in a recent address given at the annual meeting of the British Association by Mr. B. L. Goodlet, of the British Atomic Energy Research Establishment at Harwell, that the conception of "economic" nuclear power has a meaning only in relation to the cost of power from conventional sources in a specific locality. This cost structure naturally varies widely between different countries according to the availability of indigenous or external supplies of energy. Yet in a country—such as the United States—where abundant relevant natural resources exist, the use of nuclear power may be less economic than in certain underdeveloped countries where nuclear energy may only be obtained from external sources at high cost or in insufficient quantities. Even in the United Kingdom, with its rich coal resources, the economic prospects of nuclear power improve as coal prices continue to rise and the demand for electricity tends to outstrip the national demand for coal.

These considerations promote interest in two units which have a marked bearing on the problem of current nuclear supply, namely the natural uranium reactor and the breeder reactor. The first nuclear power station now being built in the United Kingdom embodies a natural uranium reactor, an equipment which, if operated at a markedly high load factor, could generate electricity at about 1d. per kWh. in comparison with the present average cost of coal-generated electricity in U.K. power stations of approximately 0.54 d. per kWh. The nuclear plant may appear the more economical owing to the fact that no allowance has been made for by-product revenue, but from the viewpoint of fuel utilization the natural uranium reactor is wastful, as owing to technical factors one ton of uranium used in such a plant provides the heat equivalent of no more than approximately 9,000 tons of coal. The full implications of these statistics are realized when it is considered that Britain's present entire electric power supply requires 36,000,000 tons of coal and coke per annum. Should the supply be based on natural uranium reactors, therefore, the operation would involve an annual consumption of 4,000 tons of uranium, all of which would of necessity be obtained from overseas. The final impact makes itself felt when the U.S. Atomic Energy Commission's price for uranium oxide at £2,800 per ton is considered. Mr. Goodlet estimated that a plant of this kind may nevertheless prove economical at a capital cost of two to three times that of a conventional plant, assuming the rates of interest, redemption and maintenance are the same.

The breeder reactor, on the other hand, is capable of producing in the fission process more nuclear fuel than it consumes, although breeding does not entirely obviate the necessity of refuelling the reactor. Despite this, the consumption of nuclear fuel in a breeder reactor is a fraction of that of a natural uranium reactor.

The view is widely held in the United States that for the time being nuclear electric power offers little prospect of becoming economic there, unless linked in some form with the production of fissile materials for military purposes. The cost of electric energy generated from enriched uranium may reach 6d. per kWh. or more, and nuclear power derived from it is therefore likely to be of military interest only.

In all, Mr. Goodlet considered it possible that economic nuclear power might be developed in the future, and its merits were substantially endorsed in a speech recently made in New York at the convention of Railway and Utility Commissioners by Dr. W. L. Davidson, director of the U.S. Atomic Energy Commission's Office of Industrial Development. Dr. Davidson referred to unofficial estimates suggesting that even at a price of natural uranium metal as high as $35 per lb. or £28,000 per ton, electricity might be produced in an atomic reactor in the United States at a nuclear fuel cost of less than half the cost per kWh. of a coal-fired station.

Failure of Talks on Australian Uranium Imports

The possibility of any increase in imports of Australian uranium to this country is now remote, as the United Kingdom and Australian Governments have failed to agree on satisfactory terms of the supply.

It was pointed out in last week's issue that the suggestion to increase uranium imports was to be raised with the Australian Government by Lord Cherwell, chief scientific adviser to the Cabinet, although the efforts of the United Kingdom might be affected by previous Australian commitments to the United States. It has now been reported in a section of the Australian press that the British Government's terms were considered as onerous in Canberra. It was felt that too many conditions were imposed to allow for acceptance by the Australian Government.

The Australian viewpoint was forwarded by Mr. Menzies, who pointed out in the House of Representatives on Tuesday that the Australian Government would not enter into any agreements which might result in a shortage of uranium in Australia. He added that the Government had made no contracts for uranium sales since those contracted with the Combined Development Agency of the United States and Britain.

On the other hand, the Prime Minister said that the recently concluded talks with Lord Cherwell were purely of an exploratory nature, being concerned with the extent of the deposits and the scale of development work. The price of uranium or uranium oxide sold under the C.D.A. contract could not be disclosed, but it was a reasonable price which would allow Australia to produce uranium for defence purposes and enable them to be carried out.

Portugal

(From Our Own Correspondent)

Oporto, October 8.

To study Portuguese exports for August is to realize the truth of the axiom that "the only method of assessing the success or non-success of a new policy is to examine the results obtained."

To commence with tungsten ores, a total of 377 tonnes was exported in August; 275 of which went to U.S.A. and 102 to U.K. If this total represented normal routine exports there would be no cause for comment, but it can be said that 100 per cent of that total was composed of long term contracts and that no new orders have been booked since July. After the end of this year, with one exception, so far as your correspondent is aware, there will be very little to carry forward to 1954. What the future holds for the tungsten ore trade here, with no interest in that ore, tendency to fall in price on consuming markets, increasing taxation here coupled with no sort of interest in official quarters regarding the speeding up of exports, is a matter for the natural sequence of events to decide. Turning to cassiterite the results for August are deplorable, but they can be construed as a very real "writing on the wall" and can be

applied to all other ores, exports of which have declined as a perusal of the August exports will show.

As matters stand at the moment, it appears that within three months the great majority of the mines may be forced to close down.

Portuguese mineral exports in July in tonnes were as follows: wolfram 226, cassiterite 72, cupreous pyrites 33,549, roasted pyrites 100, roasted and leached pyrites 8,570, white arsenic 106, haematite 16,766: and in August wolfram 377; cassiterite 16; cupreous pyrites 11,238; haematite 7,801; arsenic 138.

Figures of output for June in tonnes were, wolfram 260, cassiterite 493, cupreous pyrites 52,324: and in July wolfram 328; cassiterite 101: cupreous pyrites 60,166. Figures are now available for the ouput of various mixed mineral products for the first half of the year, items and tonnages are as follows: WO_3/Sn concentrates 297, Sn/TiO_2 concentrates 568, auriferous and argentiferous pyrites 1,340, ilmenite 129.

South Africa

(From Our Own Correspondent)

Johannesburg, October 8.

By the middle of next year the first units at Sasol—South Africa's oil from coal plant—are expected to be in operation, and in full production by the end of the year. This project, which it is now estimated will involve capital expenditure in the neighbourhood of £30,000,000, will be the largest in the world. Apart from an annual output of petrol of 70,000,000 gallons a year as well as a range of other fuels, it is designed to produce a wide range of chemicals which can form the basis of large-scale chemical industries.

The key to this project is the immense coal deposits lying immediately south of Vereeniging on the Free State side of the Vaal River. The coal is of low-grade. Up till now its only major use has been the firing of the boilers of the various Electricity Supply Commission's power stations in this area which provide the bulk of the power needs of the gold mining industry and secondary industry in the Southern Transvaal. Investigation of this coal, however, has shown that it is emminently suitable for gasification which is the basic process involved in the production of oil from coal.

PLANNED OPERATIONS AT SIGMA

The Sasol plant will be fed by the Sigma Colliery, which is under the control of Anglo-Transvaal Consolidated. Mineral rights cover some 14,500 acres and surface rights approximately 5,000 acres. This area is underlain by three seams of coal at a depth of 400 ft. It is estimated that this should meet Sasol's needs for 110 years on the basis of a production rate of 180,000 tons a month.

The main deposit is the 25 ft. wide middle seam, which has an estimated life of 80 years. On the northern section of the property, the seams dip slightly to the south, but later continue for 3½ miles to the southern edge virtually flat.

Shaft-sinking has now been completed and initial production should be underway by the end of the year. The feature of this property is that it will be the most highly mechanized colliery in South Africa as well as the largest single producer using one outlet.

The colliery has three shafts, the pitheads of which are all within a small area. There is a vertical shaft handling men and material; a vertical upcast ventilation shaft equipped with large exhaust fans; and an incline shaft intersecting the coal seams at an approximate depth of 400 ft.

This last shaft is 1,450 ft. in length, 20 ft. wide and 9 ft. high, and is concrete-lined throughout. Up the centre a 48 in. wide conveyor belt will operate, carrying coal from the crushing and screening plant which is sited at the bottom of the shaft. The coal will then be fed on to a further belt which will transport it 1½ miles across country to the Sasol plant. Travelling ways on either side of the belt in the incline shaft will provide suffiicient room for moving heavy equipment for major servicing on the surface.

THE MINING SYSTEM

Mining will be conducted on a panel system, the life of each panel being about 15 months. Eight headings will be driven into the panel from one end, leaving the other three sides intact. The middle seam will be attacked from top and bottom by mechanical cutters each dealing with 12 ft. of coal.

Broken coal will be collected by mechanical loaders, which in turn load on to shuttle cars which move it and dump it on to a conveyor belt which, in turn, feeds on to the main belt to the crushing and screening plant. As the panels extend southwards, the incline shaft will be extended on the flat and will ultimately be over three miles in length.

As Sigma is a fiery mine, the panel system has the great advantage that as each panel is mined out, it can be easily sealed off from other workings by concreting headings on the one side thus reducing the risk of fire or explosion to a minimum.

The intensive mechanization of this colliery is allowing of major economies in the field of labour. It is estimated that the production of 7,600 tons of coal a day will require the services of 40 European and 350 African miners. Under the manual lashing system, the number required would be about six times as great.

IMPLICATIONS OF NATIVE LABOUR

The ability to employ such a small native labour force has certain interesting implications and developments will certainly be watched with great interest by the mining industry as a whole. In the first place it will allow recruiting to take place on a selective basis, and allow of a greater measure of training to be undertaken than is possible where a very large labour force is employed. More important, however, the limited number of African workers needed makes it an economic proposition to provide a relatively large number of houses for married employees in proportion to single quarters. This means that the greater part of the native labour force will be on a permanent basis of employment as they settle in the area with their families.

One of the major difficulties encountered in the adoption of large-scale mechanized mining techniques in this country is the migrant system of employment. As a worker is only employed for a limited number of shifts, it takes a considerable number of these to train him as an operative and, in consequence, his period of work as an efficient member of a team is limited. Furthermore, under such a system it is virtually impossible to obtain the maximum benefits of team work as the membership of the teams is continually changing. This handicap is fully appreciated by the mining industry as a whole, but it has not been possible so far to make much progress towards overcoming it as the creation of large permanent family settlements raises important economical, social and political problems involved in such a major change. These are not so pronounced in the case of Sigma and it will be interesting to see to what extent productivity is raised over the next year or so when the long-term aspects work themselves out.

Conservation of Manganese

The supply of manganese has caused some concern in Western Europe, and although the assumed rate of production expansion will satisfy a normal growing demand, new major mining prospects will be necessary to meet the estimated expanded requirements of the next twenty-five years. In the following article the author presents a précis of various official reports on the subject of manganese conservation, and discusses possible methods of economy in the use of the manganese resources of the world.

Manganese has been described as the "Achilles heel" of the steel industry. Of the world's major steel producers, both the United States and Britain have to import practically all their requirements of this key mineral, Russia alone having large deposits readily accessible.

The amount of manganese used for steel-making has been technically determined; one ton of crude steel requires about 13 lb. of manganese. On this basis the Paley Report estimates that the total U.S. consumption of manganese ore with an average Mn content of 46 per cent will be about 2,700,000 tons in 1975 as against 1,800,000 tons in 1950. The free world's total manganese ore requirements in 1975 are placed at 5,000,000 tons. Although this rate of expansion will demand major new mining projects, supplies of high-grade manganese available to the free world over the next 25 years and beyond should be adequate to meet the normal growing demand, even without the possibility of the U.S.S.R. eventually entering the world market.

The U.S.S.R. claims about one-third of the world's known reserves of manganese; according to the Paley Report it possesses over half the known reserves. Even at the high Soviet rate of consumption—believed to be about 1,000,000 tons annually—Soviet demands up to 1970 will only aggregate some 80,000,000 tons. At the end of 1948, the U.S.S.R. ceased to supply the United States with manganese ore; by 1950, Soviet manganese exports to the free world had practically ceased.

CONSERVATION OF SUPPLIES

Information supplied to O.E.E.C. by member countries indicates that, despite the favourable long-term outlook envisaged by the Paley Report, the supply of manganese has caused some concern in Western Europe. Under pressure of economic conditions, and owing to the high price of manganese ore, special attention has been given to the conservation of manganese by all principal users.

In 1949 a Working Party of the Iron and Steel Committee of O.E.E.C. drew up a questionnaire on manganese and considered possibilities of increasing imports of rich ore from overseas territories. In 1950, following developments in the Far East, the Council asked the Committee to study the possibility of economising raw materials. Since member countries were dependent on manganese imports from overseas, the only practical way of remedying the shortage seemed to be to conserve available supplies. The Committee therefore went on with its previous study from the more technical standpoint of possible economies in iron and steel production.

This study was entrusted to a restricted Working Party, which based its work on a memorandum of the United Kingdom Delegation and a questionnaire on manganese ore. Countries were then asked to make individual reports on their practice regarding the use of manganese. These memoranda served as a basis for a report published on April 1, 1953. On the basis of these data the Secretariat of the Iron and Steel Committee has now published a review which outlines the problem of consumption and recovery of manganese in the member countries *(Manganese in the Iron and Steel Industry—Use, Recovery, Supplies).*

So far it has not been found possible to replace manganese by other metals capable of imparting the same properties to steel. Manganese not only acts as a de-oxidizing and de-sulphurizing agent on steel, but also combines with the steel to give it properties of resistance and ductibility which are especially suitable for working it hot (particularly in the case of low carbon steels.) The discovery of these properties has made it possible to reduce considerably the cost price of steel and to increase output.

The technical conditions governing the use of manganese vary considerably not only from one country to another, but also in the different undertakings of a given country. The O.E.E.C. study has been confined to ordinary steels obtained by the basic or acid open-hearth and Bessemer processes, including very high carbon steels such as are used in rails. This definition covers most of the commercial steel manufactured at the present time with a manganese content of between 0.30 and 1.50 per cent, but excludes what are normally called special steels.

Manganese is used in the form of ore for making pig iron, and in the form of ferro-manganese and/or spiegel for steel making. For the former purpose it may be contained in various iron ores, or it may be introduced into blast furnace charges in the form of lean manganese ores or of slag with high manganese content.

The chief elements it is necessary to eliminate from the steel are the sulphur and phosphorus contained in the two raw materials required for making pig iron, namely iron ore and coke. Member countries were therefore asked to indicate the Mn and P contents of local and imported iron ores, the maximum and minimum sulhpur content for blast furnace coke, and the consumption of coke per ton of pig iron. The use of manganese in the final stage depends on the quality of the pig iron used for steel making, the manufacturing process, and the type of steel required. The countries were therefore asked to indicate the proportion of scrap and pig iron used for steel making, the breakdown of the output between the different processes and, for each process, the usual way of using Mn for eliminating P and S. To estimate possible economies both in consumption and by recovery, they were also asked to mention any measures taken to modify steel specifications involving a reduction of their Mn content, and the approximate amount of slag produced for each type of steel.

IMPORTANT ROLE OF INDIGENOUS ORES

The information thus obtained shows that to a very large extent the manganese requirements of the blast furnaces in making pig iron is now met in certain countries by the use of local ores, imported low-grade ores or slags, and that imports of high manganese ores are practically confined to the manufacture of ferro-manganese. In addition, the main use of the manganese-bearing indigenous ores is to impart a relatively high manganese content to that proportion of the pig iron which is used for open-hearth steel making. In several countries, the manganese content of the pig iron is adequate to supply the manganese required in steel making up to the finishing stage; consequently the use of the imported rich manganese ores and of ferro-manganese is restricted to that required to give the finished steel its desired specification. In these circumstances it would be difficult to foresee any marked reduction in the requirement of manganese unless there was a drastic change in steel specifications.

Both the local ores and the coke used in the United

Kingdom show a much higher sulphur content than those used in most of the European countries, and it is therefore necessary to carry a higher proportion of manganiferous ore into the blast furnaces in order to produce the required sulphur specification in the pig iron. A considerable amount of work has been done and further research is being carried out to improve and extend the practice of desulphurization in order to minimize the quantity of lower-grade manganese ores required for this purpose.

For various reasons the requirements of manganese per ton of steel are higher in Britain than in European countries. In the first place, the average manganese content specified in British steels is higher than in European countries in general. Secondly, over 90 per cent of British steel is made by the open-hearth process in which the proportion of pig iron charged is considerably higher than in Continental practice. This pig iron, in general, has a much higher phosphorus content than that used in the open-hearth process on the Continent. Consequently, there are higher manganese losses due to the increased volume of slag which must be carried in the steel-making process.

Examination of the data submitted indicated that the weight of manganese per ton of steel in the actual steel-making process did not vary significantly in any of the Western European countries, apart from variations arising from the different methods of steel-making. The gross amount of manganese used per ton of steel made, however, is higher in the United Kingdom, due to the nature of the raw materials available and the higher proportion of open-hearth steel produced.

POSSIBILITIES OF FURTHER ECONOMY

Some possible methods of further economy are indicated by O.E.E.C. It will be generally accepted that practically the whole of the manganese present in the pig iron used in the Bessemer or electric arc processes is lost during the oxidizing period of the steel-making; to this extent, any reduction in the manganese content of the pig iron used would therefore represent an economy. At the present time, the main purpose of the manganese-bearing ores used in the blast furnace making pig iron for these processes is to attain the desired sulphur content. Attention is drawn to the possibility of reducing the amount of manganiferous ores thus used, and maintaining the desired sulphur content of the pig iron, by the use of one of the well-established methods for desulphurizing the iron.

While many of the local manganese-bearing ores are unsuitable for the manufacture of ferro-manganese, it might be possible to concentrate the use of these ores in furnaces making spiegel and pig iron for the open-hearth processes and thereby enhance the manganese content of this type of iron. O.E.E.C. emphasizes the desirability of reserving high-grade manganese ore for the production of ferro-manganese.

Attention is also drawn to a process used in Germany, whereby an increased yield of manganese in the production of ferro-manganese in blast furnaces may be procured by control of the composition of the slag. Finally, stress is laid on the importance of extending the practice of sintering ore fines before charging into the blast furnace, since the process of sintering often helps to eliminate sulphur content.

As an indication of the scope for increased recovery, the Paley Report points out that the manganese content of the finished steel represents only approximately one-third of the original manganese entering the process. A statistical survey by the American Iron and Steel Institute has shown that every year a large proportion of the 772,000 tons of manganese contained in open-hearth slags goes to slag dumps. This quantity, which is more than that purchased annually by the steel industry for its own consumption, is entirely derived from the blast smelting of iron ore.

Open-hearth slag contains about 7.5 per cent manganese and 20 per cent iron, and is thus a substantial potential source of suppy. About 6,500,000 tons are created when annual steel production runs 90,000,000 to 100,000,000 tons. Another important loss, although minor in magnitude compared to the loss in open-hearth slag, is suffered in the conversion of high-grade manganese ore into ferro-manganese. Half of the loss goes into the slag and half into fumes. Manganese in this slag is too dilute for easy recovery, but recovery from the fumes might be possible by electric precipitation, agglomeration, and resmelting.

As long as foreign manganese is available, U.S. steel producers have no very great incentive for developing and installing processes for recovering manganese from slags or from low-grade domestic ores at a higher price. Nevertheless, the authors of the Paley Report consider that, in view of possible recurrence of the crises in manganese supply, more consideration should be given to such processes. This view is shared by the American Iron and Steel Institute, which has appointed a Sub-Committee to investigate methods of recovering manganese from slags. Activities were started in early 1949 and are continuing. At present three different processes are being evaluated and these are briefly described in the O.E.E.C. report.

One process now being studied in a pilot plant by the U.S. Bureau of Mines in co-operation with the Institute produces a synthetic manganese ore from open-hearth slag by reducing it with anthracite in a blast furnace and then using a special technique to oxidize the manganese in a Bessemer converter. A high-purity iron, well suited for the production of alloy steels, and a phosphate slag are desirable by-products. A second Bureau of Mines process invloves the clinkering of slag with lime or limestone at a temperature of about 2,300 deg. F. The resulting material is subjected to a reducing roast at about 1,300 deg. F. in order to convert the manganiferous material to MnO. After reduction, the product can be leached with an ammonium carbonate solution. The manganese is recovered from the solution in the form of manganese carbonate by the elimination of ammonia, which can subsequently be used again. In a third Burea of Mines process slags are treated with either solid or gaseous chlorides at a high temperature that will cause the volatilization of iron and manganese chlorides. The volatilized chlorides may be condensed on a cold surface or dissolved in water for subsequent separation to produce a very pure manganese oxide and either iron powder or iron oxide.

CLINKERING PROCESSES

The Alabama Metallurgical Laboratory has developed a method for concentrating manganese in substances with a low manganese content; e.g., local low manganese-bearing ores or slag from steel plants. It consists in the clinkering of manganese-bearing substances in a blast furnace to produce a high manganese pig-iron, followed by the subsequent oxidation of the pig iron in a converter to produce slag with a high manganese content. Laboratory tests have shown that slag containing as high as 50 per cent MnO could be produced by reducing the pig iron containing 3-4 to 0.8 per cent manganese. These slags have a manganese oxide/iron oxide ratio of more than 4/1, and could be used for producing manganese ferro-alloys. In the United States this method is considered particularly useful for working low manganese-bearing ores in times of national crisis.

A process has been developed in Germany for the acid clinkering of manganese-bearing iron ore to obtain a synthetic manganese ore and to produce ferro-manganese. O.E.E.C. also describe a Swedish process for enrichment of the manganese contained in the liquid spiegel in a sulphur and oxide slag by blowing the slag's constituent elements.

The Mujgawon Diamond Deposits of the Panna District, India

The Mujgawon diamond deposits of the Panna district, Vindhya Pradesh, India, have only recently been systematically examined. This task was undertaken by J. A. Straczek, geologist of the Federal Geological Survey of the United States, and B. G. Deshpande of the Indian Bureau of Mines, and their findings reported in *Mineral Trade Notes* Vol. 36, No. 5, from which the following article is condensed. The authors consider that the profitable production quota of the Mujgawon field might be considerably increased, and at the same time stress that the Mujgawon pipe cannot be the source of diamonds in the pre-Cambrian Vindhyan conglomerates.

It is now known that the Mujgawon diamond bearing pipe cannot in fact be the source of the diamonds in the associated pre-Cambrian Vindhyan conglomerates. In fact, it has been proved that the pipe is younger than the same rocks in which the diamond bearing conglomerates occur, and that the pipe intrudes those rocks. Although this is admittedly a remarkable geological coincidence, the geologists of the Federal Geological Survey of the United States and the Indian Bureau of Mines are satisfied that it is true. The source of the diamonds in the conglomerates is therefore still to be discovered.

In a report which appeared in *The Mining Journal* of November 14, 1952, it was pointed out that a small sample of the Mujgawon ground had yielded diamonds at a rate of 15 ct. per 100 loads and that a 250 ton mill had been completed.

THE MUJGAWON PIPE

The Mujgawon pipe is an intrusive ultramafic breccia which cuts lower Vindhyan rocks. It is shaped like the island of Ceylon and is about 1,000 ft. by 1,500 ft. in diameter. The walls of the pipe dip inwards at an angle of 70 to 85 deg., a fact not hitherto recorded, and therefore the area of the pipe probably will decrease markedly in depth, much as do the South African pipes. Mill tests reportedly indicate that the diamond content of the pipe averages 10 ct. per 100 tons, but these mill tests apparently involve at most a few thousand tons of pipe material recovered from a small surface area of the pipe. Moreover, it is suspected that a part of the material run includes weathered surface debris in which the diamond content may be expected to be slightly higher than normal.

The greater part of the area of the pipe has not been sampled, and no test drilling has yet been done by the operating company. The two drill holes put down to a depth of approximately 200 ft. some years ago did not disclose any diamonds, possibly because the holes were too small in diameter and were too few. A point of interest is that the boundary line of an adjoining lease holder passes 100 ft. inside the contact of the pipe, and the company has so far been unable to conclude a deal with the owner, though negotiations are still going on. This matter would become serious only if the pipe pitched under the boundary of the neighbouring lease but would not be serious, in view of the inward dipping walls of the pipe, if the pipe is vertical or if it pitched away from this boundary line.

EFFECTS OF PREVIOUS OPERATIONS

Conglomerates occur at more than one horizon in lower Vindhyan shales but only the lower bed has been extensively mined. The extensively mined part of the area underlain by this lower conglomerate covers an area of about 1 to 1½ miles in length and ¼ to ½ mile in width. In this area approximately 25 per cent of the conglomerate has already been mined from scattered shafts. The strike limits and down dip limits of workable conglomerate have not yet been determined, while the thickness of the conglomerate could not be determined in the recent examination owing to water laden shafts. The figure of 6 in. for the average thickness appears to be acceptable in view of previously published information, but the grade of the conglomerate is not well enough established.

One test run on 100 tons yielded 26 ct. in diamonds and it is thought that none of the conglomerate will go below 20 ct., although such an opinion based on only one test run may be optimistic. Because past mining operations have disturbed the ground over a wide area the field has become a water reservoir so that pumping involves lifting a huge volume of water even during the dry season.

ALLUVIAL DIAMOND-BEARING GRAVELS

Alluvial gravels carrying diamonds are distributed throughout the area. The pay gravels lie on bedrock and occur in cracks and crevices in the underlying rocks, and generally are covered by a few inches to several feet of barren soil. The pay gravels range in thickness from a few inches to as much as 2 ft., but the average thickness in mined areas is about 6 in. or rather less. The diamond content of the gravels is reported to be 6 ct. per 100 tons, but no systematic test pitting and sampling of the gravels has been attempted, whilst at the same time the extent of the gravels now being worked is not known and wide areas of unworked ground of unknown economic value occur. Some 60 per cent of the diamonds from the pipe are reported to be of industrial quality, and 80 per cent of the diamonds from the conglomerate, and possibly from the gravels, are of gem quality.

CONCLUSIONS AND RECOMMENDATIONS

The report recommended that the diamond-bearing Mujgawon pipe should be drilled, preferably by a large diameter coring drill, to determine its outline and extent in depth. The surface of the pipe should be systematically bulk sampled and the samples run through the mill to determine recovery grade. The diamond-bearing conglomerates should be systematically tested by shaft sinking and bulk sampling and milling of the samples, as milling could easily be accomplished by a small portable washing and jigging plant. The shafts would be in rather soft shales and would range in depth from several feet to perhaps 100 ft., with the deepest working shafts about 65 ft. deep. Concomitant with shaft sinking the conglomerate field should be drilled to determine the depth to the conglomerate and its extent and thickness, but drilling obviously cannot give satisfactory information as to grade.

The gravel field should be systematically test pitted and sampled by pits of such a size that a 6 in. thick bed of pay gravel would yield a 20 ton bulk sample. The present plant is merely a pilot mill, poorly designed and badly located. Its capacity is limited by the crushing section, only because undersized material is passed through the crushers, and is not by-passed through grizzlies and screens.

Swedish Compressed Air Equipment and Techniques

As reported in our columns last week a party of technical journalists, including representatives of Britain's leading mining publications, has recently completed an eight day visit to Sweden at the invitation of the Atlas Diesel Company. While, naturally enough, the principal purpose of the visit was to provide the British technical press with an opportunity of studying Atlas compressed air drilling equipment both in production and on the job on various mines and civil engineering projects, the party also had the opportunity of seeing an interesting cross section of Sweden's heavy industry. Our Assistant Editor, Bruce Dunfield, was a member of the party and in this and a succeeding article he gives his impressions of the trip.

Last week's visit of British technical pressmen to Sweden was at the invitation of the Atlas Diesel Company which had arranged a series of visits of considerable technical interest. These were coupled with the kind of whole hearted and spontaneous hospitality which one has come to associate with Sweden and, for one newspaperman at least, the term " Swedish method " has acquired a secondary and pleasantly social connotation.

The early part of the trip was devoted to visits to the Atlas Diesel works and to the Sandvik steel works (which supply the " coromant " drill steel which Atlas market in conjunction with their compressed air equipment), and to the Bodäs mine, which both supplies Sandvik with its iron ore and is itself the principal test mine for Atlas equipment.

As often happens on visits of this nature, preconceived opinions had to be revised, at least in point of emphasis. Thus, whatever may have been the position at an earlier period, it would appear doubtful whether to-day Atlas (or indeed any of the world's leading compressed air equipment manufacturers) can claim any consistent superiority of product in drilling and tunnelling operations. Nor, indeed, did we find Atlas willing to make any such claim on behalf of their products *per se*. It was, rather, in machine and man utilization that the Atlas engineers felt they were making a particularly valuable contribution to the mining industry. What Atlas sets out to achieve is the optimum utilization (and consequently the lowest-cost operation) of their equipment for each particular drilling problem. Nature is as unpredictable in her geological formations as in other respects, and it is in their recognition of this situation and their constant effort to apply a finite number of standardized products with maximum effect to an infinite variety of special cases that the Atlas approach is interesting.

Fundamentally, Atlas have built up their organization around the development of a system of tunnelling known as the " Swedish Method," the well-known essentials of which are based on the following equipment :

1. Light rock drills operated on pneumatic pushers.
2. Drill steels using hard metal bits.
3. A simple moveable platform of light weight from which drilling takes place, and which permits convenient passage of loaders and tubs, the platform also serving as a travelling train for shunting tubs.

A CONTINUOUS CONTROL OF PERFORMANCE

It is, however, in the planning and control of the utilization of this equipment that Atlas methods are particularly significant. Recognizing the non-standard geological conditions inherent in every drilling programme—to say nothing of variation in the labour supply from country to country—Atlas have built up at their head office extremely comprehensive performance and cost data for their equipment from all over the world and from a wide variety of geological conditions. Equipped with this data the company claims that its Project Department is able to tender for a contract in the confidence that the equipment which it specifies will be that most nearly suited to each particular job.

Mining engineers will be the first to agree that, from the point of view of the user, manufacturers might well produce a wider range of rock drilling equipment than they do but, as elsewhere in industry, the economics of quantity production dictate a compromise between standardization of products and the hand-tailored requirements of the user. There can be no doubt that in recognizing the necessity for this compromise and accepting the challenge which it implies, Atlas have gone to the root of the matter.

Moreover, their Project Department, in addition to preplanning the job and specifying equipment, goes beyond the point of sale, and actually maintains through a system of regular performance reports, often at a range of many thousands of miles, a continuous control over the actual technical and cost performance of their equipment on the project, measured against standards set at the preplanning stage.

These reports are apparently transmitted through the local Atlas representatives whether or not the client elects to avail himself of the Atlas consultancy facilities which are always available as part of the sales service. This enables Head Office to receive very early intimation of any difficulties which may be developing on a project and to take remedial action before performance has fallen too badly behind programme.

PROJECT DEPARTMENT AS TROUBLE SHOOTER

In planning remedial action, as in the pre-planning stage, the Project Department relies on data drawn from all over the world. Thus the solution of a problem in Rhodesia may well lie in Canada and it is presumably the world-wide nature of their technical records which dictates the necessity of a centralized Project Department at Head Office rather than a series of local Project Departments linked to the various overseas subsidiary companies.

There is, of course, nothing particularly new in this concept, which is no more than a special application of good production control practice. It is, however, unusual to find a company attempting to maintain detailed technical control over an engineering operation at such long range and the organizational problems involved in installing this technique must have been very considerable.

In the relatively brief visit which was paid to the Atlas works it was naturally impossible to assess the exact nature of these problems nor, indeed, to determine how successfully the methods work out in practice. In any event, the answer to this question must be sought, not at Atlas Diesel's Head Office, but on the mine. In the last analysis it is the repeat order which tells the story.

Parenthetically, and quite outside the present context, we might observe that all too frequently the story is never told at all. One of the problems which is always confronting the mining journalist is the difficulty of persuading the Boards of mining companies to release information about the performance of the mining plant and equipment which they are using. This secrecy complex is not peculiar to the mining industry but there is perhaps less reason for it in an industry where geological, geographical and human

factors play a far greater part in cost variations than do the plant and machinery employed, and even the most efficiently operated mine might well find that it would gain more than it lost by a freer interchange of technical operating data.

RUBBER COATED STEEL CONVEYOR BELTS

The Sandviken Ironworks, one of Sweden's most important producers of high quality steel products, has an up-to-date plant with blast furnaces, sponge-iron reduction works, open hearth and electric furnaces, as well as hot and cold rolling mills, forges and drawing mills. The company is currently in the midst of completing an expansion programme, the final stage of which will be the installation of a new blooming and slabbing mill scheduled to go into operation next May. The Sandviken company produces for Atlas Diesel their integral hexagonal and flexible steels with carbide chisel bits and extension steels for long hole drilling. These are marketed under the name of Sandvik Coromant drill steels which play an essential part in the Swedish method of rock drilling. Coromant steel with tungsten carbide bits made at the same works was introduced in Sweden in 1944. The bit is brazed directly into the heat treated drill rod usually as a chisel shaped bit. Understandably perhaps, the party was not given the opportunity of observing the various stages by which the Coromant drill steels evolve through to the finished product. Sandvikens Jernverks AB, also owns a factory in Stockholm which produces tungsten carbide from tungsten ore of Swedish origin.

But perhaps of even greater interest to mining engineers is the part the company is playing in the development of a rubber coated steel band conveyor belt, two of which are on order by the National Coal Board in addition to the one already in this country undergoing tests. The cold rolling plant produces the steel strip for the conveyors, and hardened carbon steel or hard rolled stainless strip is used. In co-operation with a rubber factory, complete vulcanized rubber coated steel band conveyor belts are produced, and five installations are running in Sweden.

The steel strip is rolled in widths up to 32 in. (800 mm.) and in lengths of 120 yd. and it would appear that the belt has interesting possibilities. Its cost is not dearer than that of top grade 8-ply rubber belting; it weighs less inch for inch than rubber belting; it will withstand loads of up to one ton per inch; it is tremendously strong and has fireproof qualities.

Of the two belts on order by the N.C.B., one is expected in this country at the end of March, 1954, and the other around the end of June, 1954. The belts are 32 in. wide and have been cut to operate on a 600 yd. run. One belt will be installed at the Woodside Colliery in the East Midlands Division and will be used in a cross measured drift running from one seam to another, while the other will be at Bank Hall Colliery in Lancashire. Of particular interest, too, is the fact that when the belt was put on test at Stoke Orchard to assess its fireproof qualities it was found that after setting fire to the belt and submitting it to enforced draughts the steel band conducted the heat away so quickly that the fire did not spread.

However, there is another side to the picture, and in so far as its usefulness to the N.C.B. is concerned it will be necessary to work out a conveyor structure to deal with the belt, although its tremendous strength will not restrict the size of the belt driving machine. Another point is that some means must be found of troughing the belt, but it is thought that by removing the middle iddler this would meet the case when the belt was running under a load. While the N.C.B. require a 48 in. belt, this would not appear to present any undue difficulty as the company, by joining up the belts latterally, has delivered steel bands up to about 13 ft. wide. It is probable that some more thought will also have to be given to the joining ends. At present the linkage points are joined by a strip of metal bonded as an overlap. However, while the belt is ideal for trunk conveying because of its great strength which obviates the need for intermediate stations, its optimum efficiency can only be realized when it is running flat, or when the gradient is small and steady, as a steeply angled ascent causes the steel strip to exert too great an upward pull.

THE SPONGE-IRON PLANT AT SANDVIKEN

Of considerable metallurgical interest is the sponge-iron plant at Sandviken, where the production of sponge-iron is performed in vertical, cylindrical lined furnaces some 65 ft. high from pellets of iron ore concentrates from the company's own mine at Bodäs, mentioned below. Just above the bottom of the furnace hot gases, mainly hydrogen and carbon monoxide, are fed in at approximately 1,000 deg. C. The rising gases reduce the porous oxide pellets into metallic iron but at a temperature that is not sufficiently high to melt the reduced iron so that the product is in the form of small irregular pieces of porous iron 90 to 95 per cent pure, the remainder consisting of incompletely reduced oxides and gangue from the mined ore. Seventy-five per cent of the hot reducer gases are drawn off 23 ft. from the top of the furnace, cooled, and driven by fans through two separate vertical furnaces, one filled with glowing coke and the other filled with glowing charcoal. In these electrically heated carburetters the gases are regenerated for recirculation in the sponge-iron furnaces. The remainder of the gases are used for pre-heating the ore before being released to the atmosphere. The sponge-iron being readily oxidizable is cooled in closed airtight containers before being sent to storage. The product is a raw material for steel making in both open hearth and electric furnaces. The sponge-iron plant has a capacity of 20,000 tons a year.

THE BODÄS IRON ORE MINE

The Bodäs iron ore mine, a wholly owned subsidiary of Sandviken Company, was also visited and the ore, mainly magnetite, with some pyrite, is mined exclusively for supplying the sponge-iron plant at Sandviken some 28 miles away. The ore is ground, the pyrite removed by flotation, and the resulting pyrite concentrate sent to acid works. The magnetite is concentrated in magnetic separators. The resulting product is well suited for pelletizing. A moist concentrate with small addition of calcium chloride and ground limestone is fed into a slightly tilted rotating cylinder to form pellets of 1 to 2 in. diameter, and though they can be crushed in the hand, by carefully conveying them into the top of an oil-fired cylindrical furnace they are not deformed and are roasted for ten hours at about 1,200 deg. C. in an oxidizing atmosphere to convert the Fe_3O_4 to Fe_2O_3. The roasted iron-grey pellets are sufficiently robust to stand transport to the steel works with the production of only an extremely small percentage of fines.

Another and separate function of this mine is to provide a section devoted to experimental work on Coromant steel. In this section of the mine drill steel is subjected to exhaustive tests under the supervision of the research department of Sandviken. Drilling is carried out in both leptite and granite and continuous checks are made on current production under mine conditions. A simple and effective method of extracting long lengths of flexible steel by means of a curved steel strap was noted as was the technique of collaring with the special Coromant flexible steel.

TECHNICAL BRIEFS

Geobotanical Techniques in Uranium Prospecting

Geobotanical methods of prospecting in uranium-bearing areas of McKinley County, New Mexico, have been investigated briefly by the U.S. Geological Survey. Geobotanical techniques are comparatively new, based on observations that certain plants grow more prolifically around mines and mine dumps or exhibit certain typical reactions to specific minerals.

Work undertaken on behalf of the United States Atomic Energy Commission determined that the uranium analysis of trees growing on the Todilto bench and the mapping of selenium-indicator plants on the sandstones of the Morrison formation could be recommended as a method of prospecting. It was found that the average uranium content in the ash of trees rooted in ore deposits of the Todilto limestone member is more than 20 parts per 1,000,000 (ppm), while trees rooted in barren limestone average about 10 ppm. Fluorimetric methods were used to detect the uranium content of the plant ash. The area studied lies at about 6,500 ft.

The report asserts that plants are affected by uranium ore deposits in two ways. First, due to the usual association of selenium with uranium ores, plants that require selenium may grow near uranium deposits. Second, plants that are rooted in ore deposits absorb uranium and vanadium in detectable quantities.

The research involved air-drying the samples, followed by ashing and analysis by fluorimetry. In some instances the trunkwood of trees over ore was found to contain more than 30 ppm of uranium in the ash. Trunkwood samples on limestone containing less than 0.1 per cent uranium oxide averaged less than 10 ppm of uranium in the ash. The results of this cursory examination are more uniform than were expected for crude sampling in a disturbed area, and suggest that results may be contoured from an organized sampling programme in unexplored outcrop.

A Possible Source of Selenium in the U.K.

Selenium is an element which has become increasingly important during recent years, with its main uses found in the electrical and electronic industries. An article in *The Mining Journal* of August 28, 1953, stressed the scarcity of selenium in the face of increasing demand, and pointed out that the element is essentially a by-product metal which has been recovered maintly from some of the anode sludge left in electrolytically refining copper. The article referred to was concluded on the note that although no copper sulphide ores are found in the United Kingdom, the possibility that selenium might be economically recovered from some imported pyrites or copper sulphide ores should not be excluded without thorough investigation.

A recent report by the Department of Scientific and Industrial Research points out, however, that there is a possible source of selenium in this country which is the subject of an investigation now being carried out at the Department's Chemical Research Laboratory. The investigation is the result of a survey of the selenium problem made by the Intelligence Division of the Department. Iron sulphide, or pryites, is used in Great Britain in the manufacture of sulphuric acid, and like copper sulphide, it contains selenium. Flash roasting of pryites is one of the processes which are used to escape the necessity of using sulphur as a raw material. It is fairly new and is expanding here now and it may, like copper refining, produce quantities of selenium which would be worth recovering. The selenium is concentrated in wastes, dusts and muds, etc., which are left in certain parts of the flash roasting plant. Little is known yet about the economics of obtaining it.

Samples of these wastes have been examined at the laboratories and the proportion of selenium varies enormously. The wastes from three plants have been tested so far. One at least appears to be hopeful of containing enough selenium to make recovering it worth while. As in the case with copper refining the problem is to develop a method which will not interfere with the primary object of the process, and be cheap enough and simple enough to make selenium production pay.

As far as can be seen at the moment, the potential yield of selenium from this source will run into tons which, of course, would be a valuable increase of the present supplies. One of the speculative things about recovery is that the raw material, pyrites, varies so much in its selenium content. The laboratory investigation, however, shows that there are possibilities which should be seriously considered.

The Geochemical Association of Niobium and Titanium

The geological and economic significance of the association of niobium and titanium has been the subject of a paper published by Fleischer and co-workers of the United States Geological Survey (U.S. Geol. Survey Circ. 225, 1952). The bauxites derived from nepheline syenites and similar rocks show a high niobium content. 46 samples obtained from Arkansas showed an average of 0.045 per cent niobium. On treatment, the niobium tends to concentrate in the red and brown muds and the black sands. Heavy media and magnetic separation of the black sands gave a fraction containing 40-50 per cent TiO_2 and 0.5-0.8 per cent niobium. This enriched fraction constitutes between 2 per cent and 3 per cent of the black sands and in view of the scarcity of niobium would appear to be a valuable source.

Further investigations have shown that the niobium content is highest in titanium minerals from alkali rocks or from granitic pegmatites. With the increasing exploitation of titanium sources it would seem that the possible recovery of niobium ought to receive attention. Niobium is especially important in the preservation of the corrosion resistance of austenitic chrome nickel steel when heated to a high temperature. It finds use in both jet propulsion engines and gas turbines as well as in aircraft manifolds and it has numerous other high temperature applications.

The Roasting of Lean Ores

A new roasting procedure carried out at Hibbing, in the U.S.A., has been described by F. D. DeVaney (Trans. Inst. Min. Met. Eng. 193, Tech. Publ. No. 3414-B). The furnace used is circular with an inside diameter of 2½ ft. and is capable of roasting 1½ l.tons of iron per hour. The ore is fed into the top of the furnace through a hopper or conventional double bell arrangement, falls slowly through the furnace, which is kept full all the time, and is discharged from the bottom.

The furnace consists of three distinct zones, an upper zone in which the cold moist ore is preheated, a middle zone and a lower zone. The temperature of the gas leaving the mixing chamber is between 1,500 deg. and 1,600 deg. F., and of the gas leaving the top of the furnace between 150 deg. and 250 deg. F. The amount of gas blown through is between 10 and 12 cu. ft. per lb. of ore roasted. This gas is only weakly reducing and is composed of 5 per cent carbon monoxide, 15 per cent carbon dioxide with the remainder mainly nitrogen. It is non-explosive and there is, therefore, an additional safety factor should air inadvertently be permitted to enter the hot furnace.

New Superalloys

New high-strength heat-resisting alloys which are needed for United States Government projects have been developed, largely within the steel industry, which is also their biggest manufacturer. These superalloys can withstand temperatures well over 1,000 deg. F. while under great stress. The base alloys are nickel, cobalt, and iron, which comprise 65 per cent or more of the materials by weight, according to *Steel Facts*.

The high-strength heat-resisting alloys are made in electric furnaces, much as stainless steels are made. A total of 22 elements are used in the manufacture of these superalloys. As many as 12 elements are included in the compositions of some of them. According to one manufacturer, fewer than 20,000 tons of these special alloys are sold as mill products each year, but their value is high.

Though their present use is mostly military, they will have numerous civil applications—such as in commercial airplane engines and improved gas turbines.

METALS, MINERALS AND ALLOYS

While daily price fluctuations on the Metal Exchange have trended upwards, especially on Tuesday, a certain lack of assurance in the United States as to the long term outlook colours the Metal Market background. The commodity plethora and increasing strain of underpinning prices, especially of agricultural products such as wheat, cotton and animal products, etc., increases government expenses, and ultimately living costs, and suggests further financial strain as time goes on. It is probably symptomatic of current sentiment that next year's automobile output is expected to be 10 per cent down. The administration is striving to keep within the present statutory ceiling of $275,000,000,000 of public debt, and this among other things has caused the Defence Department to order a slow-down in payment for goods which is a depressant feature in that sphere of industry. Exasperation in mining circles at the heavy imports of metals and concentrates seems to be growing, and apprehension regarding the Government's present inflationary financing is expressed in some directions. While not serious factors as yet, the ventilation of these matters is both an evidence of and a factor in producing hesitation and a deferment of the normal autumn buying activity.

COPPER.—While anxieties about international developments, especially in Trieste and the Suez Canal Zone and attempts to open fresh negotiations with Russia have led to a certain stimulus to copper prices in the London market, in the United States interest has been centred rather on strike possibilities than on the position of the metal itself. This week the outcome of the lengthy negotiations between the C.I.O. United Auto Workers' Union and the American Brass Company and the Chase Brass and Copper Company is awaited with some anxiety. While the strike at the Kennecott's New Mexico Chino mine has been settled, the miners at Chuquicamata went on strike on Tuesday despite the government's plea to postpone action. While this strike continues world supplies will be diminished by some 15,000 tons a month. Workers at Potrerillos who voted for a strike at the end of last month have still to be heard from. While the strike of the International Longshoremen's Union has been called off as the result of the injunction granted against them under the Taft-Hartley Act, trouble and some rioting has developed between this Union and the recently formed A.F.L. Longshoremen's Union, which is impeding a general return to work.

There is still no news as to the finalizing of their negotiations for the purchase of the growing stock of Chilean copper now estimated at some 120,000 tons, which may possibly be complicated by the resignation of the Chilean cabinet last week.

LEAD.—The market has been steady this week and without any particular feature. In the United States the demand is still reported to be on the quiet side, but unlike zinc the statistical position is not unsatisfactory. U.S. consumption up to the end of July is reported by the Bureau of Mines at 693,580 s.tons against 616,202 in the same period of last year. Stocks at the end of July showed a drop on the month to 90,984 tons. During the seven month period consumption by the main avenues of trade were: battery makers 205,805 tons (176,700 a year ago); cable makers took 84,049 (80,455); and tetraethyl lead consumption was 91,809 tons (80,927). Total stocks of lead in ore and matte on September 1 are reported as 183,032 s.tons.

The U.S. Government have launched a civil suit under the anti-trust acts against the A. S. & R. and St. Joseph Lead companies charging that they have followed a business policy of seeking to eliminate and in fact eliminating competition.

TIN.—Tin recovered sharply on the Metal Exchange on Tuesday though the cause has still to declare itself, as the Eastern price was slightly down. The United States spot quotation, following on the calling off of the Longshoremen's strike, was reported at 80.5 c. nom. on Wednesday. The Indonesian output in September is reported as 2,943 tons which brings the nine months' output to 24,760 tons compared with 25,665 tons in the same period last year. Imports of concentrates into the Straits in September were 505 tons—Thailand 324, Burma 122. Production by the Longhorn smelter for September was 2,700 tons bringing the nine month output to 29,400 tons as compared with 11,454 tons in the same period last year, when there was, however, no recorded output for three months. Even so the production this year is the highest since 1946. Negotiations regarding the price to be paid for Indonesian tin in the final year of the three-year contract which was signed in March, 1952, are expected to start shortly. The original price was $118 c. per lb.

ZINC.—Sentiment regarding zinc remains depressed, especially in the United States where the September statistics of the American Zinc Institute were even more unfavourable than had been expected. Smelter stocks rose by 23,597 s.tons to 141,494 s.tons as compared with 117,897 tons at the beginning of the month, while there was no diminution in smelter production which totalled 81,144 tons in September, bringing to the total supply to 199,041 tons. Total shipments to domestic consumers were down about 12,000 tons to 57,547 tons. Moreover, unfilled orders fell off by some 5,500 tons. Imports of slab zinc to the end of July are computed at 180,504 s.tons compared with 52,800 in the same period last year. Japan's production is to be increased from the present figure of around 7,000 tons monthly to a maximum of 7,500 tons in the next three or four months with the completion of three new plants with an ultimate capacity of 2,500 tons, though this figure will not be immediately realized owing to lack of electric power. Price reductions are under consideration.

CHROME.—Shipments of chromite from Southern Rhodesia in the first nine months of this year amounted to 337,000 s.tons with an estimate for the whole year of 465,000 s.tons. At the beginning of the year the estimate was for 483,000 s.tons but shortage of engine power and handling facilities at Beira have prevented the estimated quantity being reached.

MANGANESE.—Exports of manganese from the ports in Madras as well as from Vizagapatam and Marmagoa will continue to be allowed against freely granted licences.

NICKEL.—The Canadian Government has terminated its control over the sale of primary nickel in Canada which has been in force for the past two years. The Defence Production Department relate this release to the termination of the International Materials Conference allocations. The U.S. Government will end its control on civilian use on November 1.

WOLFRAM.—We have heard of one or two odd parcels changing hands but generally the market remains stagnant. We should call the world buying price 290/295s. per unit and for scheelite 280/285s. The U.S. price for imported ore has been lowered to $41-42 per s.ton unit. The Canadian Minister of Mines has anounced that scheelite has been discovered in Newfoundland in a quartz vein which has been traced for three-quarters of a mile. Other discoveries in the Maritime Provinces are also reported.

QUICKSILVER.—Reports are current that Yugoslavia and Italy have been undercutting the market, but the official price in the U.K. remains at £64. 15s. per flask. In the U.S. the price has eased to $182-184 per flask nom.

GOLD.—Messrs. Samuel Montagu and Co., in their report covering the third quarter of the year, say that the international free gold market continued very inactive during the period. Supplies from producing countries were maintained but with buyers showing little interest the price tendency was steadily downwards finishing with $36.20 per. f. oz. This declining tendency manifested itself despite the political crisis in France and much talk of a further devaluation of the franc.

SILVER.—Messrs. Samuel Montagu and Co. in their third quarter circular refer to the receipt here of nearly 14,500,000 oz. from the Soviet Union (see M.J. September 18, p. 338), most of which was taken by the authorities to increase official stocks. Demand for essential industries here during the quarter was moderate and satisfied by sales from official stocks though silver from "free" market sources was also readily available.

The resentment so long felt by consumers of silver in the

United States at the floor imposed on domestically mined silver of 95½ c. per f.oz. has led to the introduction of a Bill by Senator Bush, and other New England Senators, to end the forced purchase of silver by the United States Treasury.

Nothing, of course, can result from the draft now submitted to the Senate Banking Currency Committee until next year, but if this Bill reaches the Floor of Congress past history would suggest that it would meet with a very hot reception.

Iron and Steel

For the first transactions in the disposal of the properties of the nationalized steel industry, a more favourable atmosphere is developing than seemed likely even a month ago. Business in iron and steel is booming. The September output of both pig iron and steel was the highest even for that particular month and all the indications are that before the end of the year the peak figures of production in May last will be surpassed.

More new plant is coming into production. A newly built blast furnace on the North-East Coast has just been lighted up. True it is only a replacement, since a smaller and obsolete stack has been marked down for demolition, but there will be a substantial net gain in the volume and the cost of pig iron production and cost is even more important than tonnage. More coke, more scrap and more pig iron will facilitate the further expansion of urgent production and makes it reasonably certain that the target figure of 17,500,000 tons for the year will be attained.

Market trends are also favourable. Slow to revive after the holiday period, the buying movement is gathering momentum. The improvement is most marked in the home trade. It now seems clear that stocks have been run down and buyers are in the market again for prompt and forward supplies. Engineers are absorbing big tonnages and if the supply of plates does not wholly meet the demand, better deliveries have quickened shipyard operations. Brighter prospects in the export trade have also played a part—admittedly a small part—in the revival. Relaxation of the restrictions has given a fillip to trade with the Argentine and Australia, whilst sheet makers have been able to take up increased export quotas. Re-rollers are still afflicted by the dearth of overseas orders for small bass, but a better demand for billets suggests that and far more orders for re-rolled material has been placed and if the slackness in the light castings trade persists, foundries employed on the production of high duty castings are busily employed. Prices in foreign markets are becoming more keenly competitive and export premiums have been cut but there is no hint of any early revision of the fixed home price schedules.

The London Metal Market

(From Our Metal Exchange Correspondent)

The past week has been quiet with only minor price movements but with a firmer undertone. It is believed that there is a difference of opinion amongst advocates of a Tin Buffer Pool scheme as to the basis prices to govern the Pool's activities, and it is, therefore, stressed in Exchange circles that the L.M.E. quotations are the only ones possible for this purpose, as it is only in London that tin can always be bought and sold on any market. In Singapore it is impossible to sell, and the New York quotations are usually nominal with actual transactions taking place at some different figure.

Another talking point at the moment is that of whether backwardations are likely to remain, and here opinions are fairly equally divided between those who think that the present backwardations are mainly brought about by a general distrust in the price level, and those who take the view that so long as producers do not require outside financial assistance for their metal in transit to the consuming country the price for cash metal will always remain above that for metal for delivery in three months.

The agreement between the United States and Chile for the purchase of about 100,000 tons for the former's stockpile is nearing completion, and it appears to depend upon the wording of the announcement as to whether this will be taken as a "bull" or "bear" point. There must be satisfaction that this tonnage has been taken off the world market, but this may very easily be counteracted if it is made perfectly clear that the U.S. Government is not prepared to make any further special purchases and that Chile must dispose of its current output at ruling world prices.

News continues to come in of the closing down of productions of zinc, and it is reasonable to assume that the present price will look low in two to three months' time provided there is no startling development of a peaceful nature in the international field. The demand for lead continues, and the majority of consumers are living from hand-to-mouth, which in itself tends to keep up the price and the backwardation.

The Eastern price of tin on Thursday morning was equivalent to £611¼ per ton c.i.f. Europe.

Closing prices and turnovers for the week are given in the following table:

	October 8		October 15	
	Buyers	*Sellers*	*Buyers*	*Sellers*
Tin				
Cash	£600	£602½	£607½	£610
Three months	£592	£593	£590	£592½
Settlement	£602½		£610	
Week's turnover	360 tons		550 tons	
Lead				
Current month	£90¼	£90½	£91¼	£92
Three months	£87¼	£87½	£88¼	£89
Week's turnover	3,475 tons		2,875 tons	
Zinc				
Current month	£73¼	£73½	£73¼	£73½
Three months	£70¼	£70½	£70¼	£70½
Week's turnover	3,925 tons		3,075 tons	
Copper				
Cash	£235	£237	£235	£237½
Three months	£221	£221½	£222½	£223½
Settlement	£237		£237½	
Week's turnover	2,050 tons		2,550 tons	

OCTOBER 15 PRICES

COPPER, TIN, LEAD AND ZINC

(See our London Metal Exchange report for Thursday's prices)

ANTIMONY

English (99%) delivered, 10 cwt. and over .. .. £225 per ton
Crude (70%) .. .. .. £210 per ton
Ore (60% basis) .. .. .. 20s. — 22s. nom. per unit, c.i.f.

NICKEL

99.5% (home trade) .. .. £483 per ton

OTHER METALS

Aluminium, 99·5% £150 per ton
Bismuth (min. 4 cwt. lots) 16s. lb.
Cadmium (Empire), 13s. 10d./14s. 4d. lb.
Chromium, 6s. 5d./7s. 6d. lb.
Cobalt, 20s. lb.
Gold, 248s. f.oz.
Iridium, £60 oz. nom.
Magnesium, 2s. 10½d. lb.
Manganese Metal (96%-98%) £280/£295
Osmiridium, £40 oz. nom.
Osmium, £65/70 oz. nom.
Palladium, £7 15s./£8 10s. oz.
Platinum, £27/£33 5s.
Rhodium, £42 10s. oz.
Ruthenium, £25 oz.
Quicksilver, £64 15s. ex-warehouse
Selenium, 30s. 6d. nom. per lb.
Silver 74d. f.oz. spot and f'd.
Tellurium, 15s./16s. lb.

ORES, ALLOYS, ETC.

Bismuth .. .. 60% 8s. 3d. lb. c.i.f.
65% 8s. 6d. lb. c.i.f
Chrome Ore—
Rhodesian Metallurgical (lumpy) £14 8s. 0d. per ton c.i.f.
" " (concentrates) £14 8s. 0d. per ton c.i.f.
" " Refractory £14 0s. 0d. per ton c.i.f.
Baluchistan Metallurgical .. £15 19s. 6d. per ton c.i.f.
Magnesite, ground calcined .. £26 - £27 d/d
Magnesite, Raw .. .. .. £10 - £11 d/d
Molybdenite (85% basis) .. 103s. 10½d. per unit c.i.f.
Wolfram (65%) .. .. .. World buying 290s./295s.
" " .. .. .. 310s. nom. U.K. Selling
Scheelite .. .. World buying 280s./285s.
" .. .. 300s. nom. U.K. Selling
Tungsten Metal Powder .. .. 24s. 3d. nom. per lb. (98% Min. W.) (home)
Ferro-tungsten .. .. .. 20s. nom. per lb. (home)
Carbide, 4-cwt. lots .. .. £35 13s. 9d. d/d per ton
Ferro-manganese, home .. .. £49 15s. 0d. per ton
Manganese Ore Indian c.i.f. Europe (46%-48%) .. .. .. 7s. 11d. - 8s. 7d. per unit
Brass Wire .. .. 2s. 5½d. per lb. basis
Brass Tubes, solid drawn .. 1s. 10d. per lb. basis

THE MINING MARKETS

(By Our Stock Exchange Correspondent)

Markets generally had rather a quiet week. Business was overshadowed by the turn of events in Trieste and British Guiana. The success of the government funding operation and the consequent reduction in the floating debt aided gilt-edged sentiment. This was further bolstered by the slight improvement in the E.P.U. figures for September and the turn for the better in the National Savings movement. Revenue returns, however, showed a slightly larger deficit for the week against the comparable period last year. The overall figures to date, however, as against 1952, are still some £80,000,000 to the good.

Kaffirs were affected by end of account factors and lack of interest in Johannesburg. Such stirrings as took place were mostly in uranium issues and in Stilfontein. In the latter mine, the September quarterly values were again higher and payability remained at over 80 per cent. The results from Ellaton also attracted attention and it seems quite possible that this mine may start production before it is floated off as a separate entity. Luipaards Vlei shares remained unaffected by the news that a tax refund covering the last 25 dividends paid will shortly be made. This is expected to be about 11d. in all. There were market rumours emanating from Johannesburg of the possibility of a better price for uranium. There is an idea that other Commonwealth producers may be getting a higher price than South Africa. The secrecy over production figures is still under fire and it certainly represents a grave drawback when attempting to assess the prospects of individual mines. There was an increase in the Rand native labour force against the usual trend for this time of year. Consolidated Main Reef shares were sharply marked down after the publication of the report for the year ending June, 1953. Working profit is down by some £300,000 and as the prospective ore reserves are small the directors anticipate that the scale of operations must decline during the next few years.

O.F.S. shares again slipped back. There is a feeling in the market that perhaps the fall has now been overdone especially for mines which have recently turned in more encouraging results. Some radical changes in the situation, however, must be looked for before the public are likely to become interested again. Free State Geduld 6 per cent Notes opened at 9d. premium above the issue price of 55s.; they later fell to around 6d. premium. They carry conversion rights into the ordinary for the next 18 months.

West African gold shares were idle. Little notice was taken of the encouraging Konongo reef strike on the 15th level.

In the miscellaneous gold section, business was very quiet. Rhodesian producers hardened slightly on reports that the Southern Rhodesian government was considering once again subsidizing gold production. Zambesias jumped following sudden demand on a narrow market. British Guiana Consolidated rose 3d. despite local political troubles. The improved Potaro dredge results caused this.

Coppers were very quiet but the good Roan and Mufulira figures gave some encouragement. The Tanks dividend was considered disappointing. Investors in this section are still very cautious. Recent hopes of good developments from Esperanza have now been justified. The company has shipped a large amount of high grade ore since May and encouraging development results have been obtained on the property.

Eastern tin shares were mostly lower but Renong advanced sharply to 8s. 7½d. following the September returns. In the Nigerian section, columbite producers appear to be going all out to mine the metal even at the expense of tin. No confirmation has been received of recent rumours that the United States proposed to extend the agreement beyond 1954. Naraguta shareholders have now received communications from both the directors and the two intending candidates for the Board. The current position is discussed in Company News and Views.

	Price Oct. 14	+ or — on week
FINANCE		
African & European	2/-	—1/-
Anglo American Corpn.	5/-	—1/-
Anglo-French	17/6	.....
Anglo Transvaal Consol.	20/-	.....
Central Mining (£1 shrs.)	28/-	—6d
Consolidated Goldfields	48/6	—9d
Consol. Mines Selection	23/9	—7½d
East Rand Consols	2/6	.....
General Mining	3½	—⅛
H.E. Prop	37/6	.....
Henderson's Transvaal	7/6	.....
Johnnies	53/6	—1/-
Rand Mines	3 3/16	+1/16
Rand Selection	30/7½	—7½d
Strathmore Consol.	27/6	.....
Union Corp. (2/6 units)	27/6	—6d
Vereeniging Estates	3 1/16	.....
Writs	31/10½	—1/3
West Wits	40/7½	—1/3
RAND GOLD		
Blyvoors	39/3	—3d
Brakpan	10/3	—3d
City Deep	16/3	—7½d
Consol. Main Reef	18/1½	—1/10½
Crown	33/9	.....
Daggas	3½	+1/16
Doornfontein	21/6	—9d
Durban Deep	34/4½	—7½d
E. Daggas	13/-	—3d
E. Geduld .. (4/- units)	29/4½	—7½d
E. Rand Props	2 1/16	.....
Geduld	4	.....
Govt. Areas	11/9	—3d
Grootvlei	21/9	+3d
Libanon	9/6	—1½d
Luipaards Vlei	21/6	—6d
Marievale	17/9	—6d
Modderfontein East	17/6	.....
New Kleinfontein	18/1½	.....
New Pioneer	16/9	—1/3
Randfontein	41/9	—9d
Robinson Deep	11/3	—1½d
Rose Deep	12/6	—6d
Simmer & Jack	4/9	.....
S.A. Lands	20/-	.....
Springs	4/3	—1½d
Stilfontein	25/6	.....
Sub Nigel	2⅛	—1/16
Van Dyk	4/9	—1½d
Venterspost	12/9	.....
Vlakfontein	13/-	—3d
Vogelstruisbult	30/9	—3d
West Driefontein	6½	.....
W. Rand Consolidated	2 1/16	.....
Western Reefs	2 1/16	—1/16
O.F.S.		
Freddies	8/9	—3d
Freddies N.	8/7½	—3d
Freddies S.	8/-	—6d
F. S. Geduld	2 1/16	—1/16
Geoffries	14/-	—6d
Harmony	22/-	—9d
Loraine	7/3	—3d
Lydenburg Estates	11/-	—3d
Merriespruit	8/-	—1½d
Middle Wits	14/-	—6d
Ofsits	33/1½	—1/3
President Brand	26/6	—6d
President Steyn	21/6	—9d
St. Helena	13/-	—10½d
Virginia Ord.	11/6	—3d
Welkom	17/-	—9d
Western Holdings	3½	—1/16
WEST AFRICAN GOLD		
Amalgamated Banket	1/9	.....
Ariston	5/9	—1½d
Ashanti	20/4½	—7½d
Bibiani	5/3	.....
Bremang	2/1½	—1½d
G.C. Main Reef	3/6	—1½d
G.C. Selection Trust	6/-	.....
Konongo	2/4½	—1½d
Lyndhurst Deep	1/-	.....
Marlu	1/4½	.....
Taquah & Abosso	3/-	—3d
AUSTRALIAN GOLD		
Boulder Perseverance	2/6	.....
Gold Mines of Kalgoorlie	13/4½	—7½d
Great Boulder Prop.	9/9	.....
Lake View and Star	14/3	+3d
Mount Morgan	17/3	.....
North Kalgurli	6/9	+3d
Sons of Gwalia	5/6	—6d
South Kalgurli	6/6	—3d
Western Mining	11/9	—1/-
MISCELLANEOUS GOLD		
Cam and Motor	9/6	—3d
Champion Reef	5/-	.....
Falcon Mines	7/3	.....
Globe & Phoenix	24/-	.....
G.F. Rhodesian	5/3	—3d
London & Rhodesian	5/-	+3d
Motapa	1/6	.....
Mysore	3/4½	+1½d
Nundydroog	5/9	.....
Ooregum	4/1½	—1½d
Oroville	11/9	.....
MISCELLANEOUS GOLD (contd.)		
St. John d'El Rey	26/6	.....
Zams	30/6	+1/-
DIAMONDS & PLATINUM		
Anglo American Inv.	3 1/16	+1/16
Casts	21/3	—3d
Cons. Diam. of S.W.A.	4½	+⅛
De Beers Defd. Bearer	60/3	—6d
De Beers Pfd. Bearer	15⅛	+⅛
Pots Platinum	7/1½	+1½d
Watervaal	11/-	.....
COPPER		
Chartered	53/3	—4½d
Esperanza	5/10½	+1½d
Indian Copper	3/10½	.....
Messina	3 1/16	.....
Nchanga	6 1/16	—1/16
Rhod. Anglo-American	48/-	+3d
Rhod. Katanga	14/10½	—1/-
Rhodesian Selection	15/3	—1/-
Rhokana	17⅛	—⅛
Rio Tinto	19½	—1
Roan Antelope	15/1½	+9d
Selection Trust	31/3	+9d
Tanks	57/-	—1/3
Tharsis Sulphur Br.	42/6	.....
TIN (Eastern)		
Ayer Hitam	23/9	.....
Bangrin	8/-	.....
Gopeng	7/6	—6d
Hongkong	6/-	.....
Ipoh	14/4½	—7½d
Kamunting	8/6	—4½d
Kepong Dredging	4/9	+3d
Kinta Tin Mines	10/-	.....
Malayan Dredging	23/9	—3d
Pahang	13/7½	—3d
Pengkalen	8/-	.....
Petaling	7/10½	—4½d
Rambutan	10/3	—3d
Siamese Tin	8/1½	—4½d
Southern Kinta	13/3	.....
S. Malayan	23/6	.....
S. Tronoh	7/9	—3d
Sungei Kinta	10/-	.....
Tekka Taiping	4/3	—1½d
Tronoh	22/-	—9d
TIN (Nigerian and Miscellaneous)		
Amalgamated Tin	10/-xd	—4½d
Beralt Tin	24/-xd	—3/-
Bisichi	4/-	—3d
British Tin Inv.	12/1½	.....
Ex-Lands Nigeria	3/6	—1½d
TIN (Nigerian and Miscellaneous) contd.		
Geevor Tin	9/6	—3d
Gold & Base Metal	3/4½	—1½d
Jantar Nigeria	7/7½	—9d
Jos Tin Area	11/3	.....
Kaduna Prospectors	2/3	.....
Kaduna Syndicate	2/3	—3d
London Tin	5/1½	—1½d
United Tin	2/7½	—3d
SILVER, LEAD, ZINC		
Broken Hill South	2½	.....
Burma Mines	1/4½	—1½d
Consol. Zinc	22/9	.....
Lake George	9/-	—3d
Mount Isa	30/-	—1/-
New Broken Hill	21/9	—3d
North Broken Hill	2 1/16xd	—1/16
Rhodesian Broken Hill	10/6	—3d
San Francisco Mines	17/6	—3d
Uruwira	2/6	.....
MISCELLANEOUS BASE METALS & COAL		
Amal. Collieries of S.A.	43/-	.....
Associated Manganese	45/-	+9d
Cape Asbestos	21/1½	—1½d
C.P. Manganese	51/10½	—7½d
Consol. Murchison	20/6	+6d
Mashaba	4½d	.....
Natal Navigation	3 1/16	.....
Rhod. Monteleo	2/6	.....
Turner & Newall	57/9	—1/6
Wankie	12/1½ xr	—1½d
Witbank Colliery	3 1/32	.....
CANADIAN MINES		
Dome	$29½xd	.....
Hollinger	$22¾	—¾
Hudson Bay Mining	$73	+5
International Nickel	$70½	+½
Mining Corpn. of Canada	£3¾	.....
Noranda	$119	+1
Quemont	£5¼	—¼
Yukon	3/9xd	.....
OIL		
Anglo-Iranian	7 3/32	+1/16
Apex	41/3	+7½d
Attock	33/9	—1/3
Burmah	56/10½xd	+2/6
Canadian Eagle	28/7½	—1/1½
Mexican Eagle	22/10½	—1½d
Shell (bearer)	4½	—¼
Trinidad Leasehold	29/6	—1/3
T.P.D.	22/9xd	—1/3
Ultramar	25/-	—9d

COMPANY NEWS AND VIEWS

Roan, Mufulira and R.S.T.

The preliminary profit statements issued at the end of last week by Roan Antelope and Mufulira Copper Mines confirm the excellent results apparent from the cumulative quarterly statements issued by these companies and published in these columns on September 11 last.

Roan Antelope Copper Mines expanded its production of blister copper from 81,027 l.tons to 87,307 l.tons and this, with the higher copper prices prevailing, enabled the operating surplus to advance from £9,635,736 to £12,424,375. Tax attracted was less, £4,565,101 against £5,888,767 (no doubt reflecting savings due to the company's transfer of control to Northern Rhodesia which became effective on July 1 last) so that the net profit was nearly double the 1951-1952 figure of £4,787,574 (£2,642,914) which figure was struck after providing £3,000,000 (£1,000,000) for replacements and obsolescences. Moreover, tax adjustments in respect of previous years amounted to £2,165,000 compared with a mere £73,000 in the previous year. This may have helped the Board decide in favour of raising the total distribution which, by a final payment of 40 per cent per 5s. unit on the £8,987,688 issued capital, made a total for the year of 52½ per cent compared with 45 per cent in 1951-1952. This required £4,212,979 and after raising the allocation to reserves from £501,000 to as much as £2,801,000 the forward balance was reduced to £52,619 against £114,024.

Mulfulira Copper Mines

Mufulira Copper Mines did not fare as well as Roan and production declined slightly from 76,089 l.tons to 76,369 l.tons. Nevertheless, the improved copper price helped the operating surplus to expand to £10,535,916 against £9,336,537. Tax attracted, as in the case of Roan, was less, £3,842,041 against £5,651,927, leaving a net profit of £3,625,276 compared with £2,617,816 in the preceding year. This figure was struck after providing, in addition to all the usual charges, £3,000,000 (£1,000,000) for replacements.

The dividend was maintained at 8s. 3d. per £1 share which required £2,811,102 (£1,764,578) and after allocating £2,785,700 (£1,250,000) to reserves the forward balance was left at £125,055 compared with £99,581 brought in.

Rhodesian Selection Trust

Rhodesian Selection Trust, which holds 64 per cent of Mufulira's issued share capital, announced in a preliminary profit statement a final dividend of 1s. 3d. per 5s. share making, with the interim of 9d. per share already paid, a total of 2s. per share for the year to June 30 last, the same as in 1951-1952.

Total income for the year increased from £1,215,694 to £2,044,957, largely as a result of the increased dividend received from Mufulira. Taxation was nearly halved, £3,957 against £7,809, and the net profit was £1,797,050 compared with £1,117,572. As in the case of Roan Antelope, Rhodesian Selection Trust informed its shareholders that they will be entitled to set against their liability to U.K. income tax a credit in respect of the Northern Rhodesian tax paid by the company. In paying the final dividend now announced, it is stated that income tax will be deducted at the full standard rate.

"Tanks" Pay 45 Per Cent

An expansion in profits and a 5 per cent increase in the final dividend is announced by Tanganyika Concessions in a preliminary profit statement issued at the end of last week covering results for the year ended July 31 last.

Yeat to July 31	*Working Profit*	*Taxation*	*Net Profit*	*Dividend Pref.*	*Ord.*	*Profit Unapprop†*
	£	£	£	%	%	£
1953	2,202,667	125,000	2,077,667	8	45	997,017
1952	1,977,390	150,000	1,827,390*	8	40	809,790

* Excluding £18,734 previously provided for income tax and now no longer required.
† Excluding profit of £168,700 (1952 — £168,650) on redemption of Benguela Railway debentures credited to Capital reserve.
Note.—All figures are subject to final audit.

The raising of the final dividend by 5 per cent to 35 per cent, making 45 per cent for the year against 40 per cent in the previous year, is shown in the preliminary statement as requiring a total of £1,724,136 against £1.532,565 previously. Since the greater part of "Tanks" revenue comes from copper and from royalty payments received from Union Miniere du Haut Katanga the better results reflect the prosperity enjoyed by U.M.H.K. which, as already announced, raised its production to record levels in 1952 and paid 1,250 f. net per share against 1,000 f. net per share in the preceding year. The final dividend will be paid on the ordinary stock on or about January 29 to stockholders registered on December 18. Meeting, Salisbury, Southern Rhodesia, January 28.

Harmony's High Grade Robust Reef

Harmony Gold Mining has been much in the news of late. On September 11 last we reported the company's proposal to raise new money amounting to £4,100,000, needed to bring the mine into production, which is expected some time in the latter half of 1954, and the terms of this offer are expected to be made known this week-end.

Meanwhile, the report and accounts for the year ended June 30 last have been published and contains some impressive information.

From the general comments on the position of the mine contained in the report it is clear that a good deal of satisfaction has been derived from the development work carried out which, though on a limited scale, appears to have confirmed that the good borehole results previously announced are indicative of the grade of ore encountered underground.

So far two shafts have been sunk and work is now in progress to connect these shafts and to establish stopes in the vicinity of the ventilation shaft to provide the ore for the initial stages of production. Of the 160 ft. of development on the Basal Reef horizon accomplished by June 30, 1,505 ft. were sampled and 1,280 ft., or 85 per cent, proved payable, averaging 16.6 dwt. over a channel width of 44 in., equal to 729 in. dwt. It is thus understandable that the directors consider these values, taken in conjunction with the ventilation shaft and the H 1 borehole intersections, which averaged 629 and 1,031 in. dwt. respectively, as encouraging. Particularly so as they were able to describe the reef as being of a "robust nature"—it being relatively fault and water free.

It was intended to locate the No. 2 shaft on the site of borehole LR 8, which intersected the Basal Reef at 5,044 ft. averaging 1,437 in. dwt., and subsequently gave values of 1,532, 1,897 and 1,817 in. dwt. in three deflections. But at shallower depths the borehole encountered disturbed ground and this prompted the directors to seek a more suitable site for the No. 2 shaft and borehole LR 9 was put down. The values obtained were comparable to those found in LR 8, the Basal Reef being intersected at a depth of 5,028 ft., assaying 17.8 dwt. over a true width of 69 in., equivalent to 1,228 in. dwt. There was some loss of core due to grinding, but there was very little loss of core in the first deflection which assayed 14.9 dwt. over a true width of 63 in., equivalent to 939 in. dwt.

At June 30 last only £101,408 net cash surplus remained of the £7,043,074 of capital raised in connection with the issue of 5,600,000 shares in March, 1952. Since August the company has been operating on temporary unsecured loan facilities of up to £900,000 made available by the Central Mining and Investment Corporation and Rand Mines which is repayable by the end of next month.

Mr. P. H. Anderson is chairman. Meeting, Johannesburg, November 6.

Heavy Mail for Naraguta Tin Shareholders

With the annual general meeting of Naraguta Tin Mines now less than a week away (2.30 p.m. on October 21 at Winchester House, Old Broad Street, E.C.2), the flow of circulars to shareholders has been accelerating both from the present board and from the shareholders associated with the Parish Group of interests (see this column last week). With the limited space at our disposal readers will appreciate that we can make no attempt at a detailed report of this literary barrage, in which, incidentally, a proportion of smoke shells will be detected. In any event with so little time remaining before the meeting and with very few shares coming on the market the immediate issue can be of little interest outside the ranks of the shareholders who will already have received the four circulars sent out—two by the board and two sent out by the opposition.

For the independent shareholder who may not be particularly well placed to assess the relative personal merits of the retiring members of the board and of those who are up for election in opposition to them, the issue probably will appear to boil down to whether they want a steady investment or a quick profit at the expense of the long term interests of the company.

Those who desire the former should not, in our view, be unduly influenced by the criticisms which have been levelled at the present board in respect of their over cautious dividend policy or their inefficient operation of the property. It is true

enough that over the past three years the distributable profit earned has been substantially in excess of the dividend distribution but the reverse was the case in the preceding three years and the general impression conveyed by a study of the accounts over a longer period than this is that the board has successfully maintained a remarkably steady dividend distribution in an industry, in which profits have suffered, and will always suffer, heavy fluctuations. Specifically during the three years 1950-1952 Moody's Services estimate the total distributable profit at 53.4 per cent per share against a total distribution of 22.5 per cent; while in the preceding three years the dividend was short-earned at 10.1 per cent compared with a total distribution over the period of 12 per cent.

The past three years have been ones in which all tin companies have been earning relatively high profits owing to the high price of tin. This period is now over, at any rate for the present, and at a rough calculation we would think that the company's revenue from tin sales in the current year might well be £60,000 or £70,000 below last year's figures. This is a significant drop when it is remembered that the total trading profit in 1952 was only £79,000.

In fact this year's revenue will, of course, be substantially bolstered by much increased revenue from sales of columbite and it would be surprising if the board had not concentrated their resources on columbite production at the cost of their tin output which is precisely what the monthly mine returns and the board's circulars indicate has been happening. Moreover, with tin at its present price there must be every incentive to leave the metal in the ground if other sources of revenue are available, at any rate as long as the possibility remains of a complete collapse of the French administration in Indo-China with all that this implies for the tin outlook in Thailand, Malaya, and Indonesia. At the same time, as we emphasised last week, the present fantastic prices being paid for columbite by the U.S. Government cannot be counted on for more than another three years at the outside and if political tension down the Malayan peninsula is relaxed, the fundamentally weak statistical position of tin is likely to keep the price down and tax the liquid resources of even the most prosperous tin companies.

All in all then, shareholders who have been buying Naraguta Tin to hold should have no particular reason for dissatisfaction with the board's admittedly conservative dividend policy.

There remains the case of the speculative shareholder who is looking for a quick profit and for him no doubt the policy outlined by those associated with the Parish Group will have an appeal. There is no doubt that a distribution of 2s. 6d. (25 per cent) per share, as they propose, could be paid without immediate embarrassement. Beyond that the opposition make it clear that it would be their policy to sell some or all of the company's properties at any favourable opportunity and they imply that they consider that offers to buy will be forthcoming. Foreknowledge of this sort implies that the opposition are thinking more than one move ahead in this proposed realization of the company's assets, and clearly the most important point upon which the shareholder, who may be inclined to support this policy, should satisfy himself is what exactly is the nature of the deals the opposition have in mind. If the history of company finance teaches us anything it is that the time for the minority shareholder to be on the alert is when share deals or extensive liquidation of assets are under consideration.

Kwahu Pays More Out of Larger Profits

Kwahu Mining Company (1925), in a preliminary profit statement dealing with results for the year ended June 30 last, showed gross income at £34,573 compared with £29,260 in the preceding year. Outgoings were cut by more than 50 per cent, £7,125 against £14,508, and the net profit figure was £27,195 compared with £14,752 previously.

Shareholders participated in the improvement and a final dividend of 25 per cent on the present capital of £110,906—as increased following the amalgamation with Mount Elliott—brought the total distribution for the year to 30 per cent which compares with 15 per cent paid a year ago on an issued capital of £80,000. The total payment required £17,350 (£6,300) and after allocating £7,500 (nil) to general reserve, the carry forward was left at £15,666 compared with £13,586 brought in. The annual meeting will be held sometime next month.

Improvement in "West Africans"

Despite a sizeable increase in profits before tax for the year ended September 30, Ashanti cut its interim dividend—a disappointment which was discussed by our Stock Exchange Correspondent in last week's issue and thus needs no further comment. The reduction announced by Bibiani in its interim dividend is explained by the results shown in the table below.

Of the other West African gold producers which have completed their financial year Marlu and Konongo show substantially better working profits than a year ago but Ariston, Amalgamated Banket, and Lyndhurst Deep show lower earnings before tax. In the case of both A.B.A. and Ariston, however, both the tonnage treated and gold produced were an improvement on the preceding year's figures.

Gold Coast Main Reef has made an excellent start which comment applies even more strongly to Taquah and Abosso.

Most of the companies whose financial year ended last month finished the year strongly which holds out the hope that their current year's results will be at least as good as those under notice. Nevertheless, a high average performance will be required if the "free market" for gold sales remains at anything like its present level of around $36 per f.oz.

Company	September, 1953 Tons (000)	Yield (oz.)	Profit (£000)	Months since year end	Current Financial Year Total to date Tons (000)	Yield (oz.)	Profit (£000)	Last Financial Year Total to date Tons (000)	Yield (oz.)	Profit (£000)
A.B.A.	61	9,785	17.3	12	721	111,523	215	636	103,052	244
Ariston Gold	30	9,545	38.7	12	346	116,821	523	330	114,521	568
Ashanti	24	15,053	75.2	12	278	179,831	902	227	166,890	831
Bibiani (1927)	30	6,250	13.2*	12	363	74,121	135	361	70,775	170
Bremang†	524	2,531	12.0	9	5102	23,789	103	5434	27,027	146
G.C.M.R.	9	3,978	14.8	3	27	11,147	38	25	9,184	25
Konongo	3	2,670	13.9	12	30	28,093	133	30	26,325	119
Lyndhurst Deep	1	1,125	5.3	12	12	12,746	63	16	15,586	71
Marlu Gold	36	4,266	20.9	12	499	49,261	171	477	45,206	101
Taquah and Abosso	25	5,988	8.8	6	149	26,105	68	127	29,087	L 51

* Includes return from extra gold sales on free market of £2,865. As the basis of calculating monthly profits varies from company to company, a direct comparison one with another is not possible. The basis for any one company has, however, remained consistent unless otherwise indicated.
† Ore treated dredged in cu. yd. L indicates a loss.

Company Shorts

Higher Industrial Diamond Turnover.—The significant feature of the September quarter's diamond sales, effected through the Central Selling Organization on behalf of South African and other producers, was the expansion in industrial sales by £749,030 to £4,833,746. Gem sales were better than in the June quarter and total sales for the first nine months of the year at £45,587,000 were equivalent to an annual rate of £60,800,000 which is, of course, below the 1952 record level of £69,600,000.

Quarter	Gems	Industrials	Totals
March, 1952 ...	£13,088,113	£5,780,352	£18,868,465
June, 1952 ...	£11,284,240	£8,136,752	£19,420,992
September, 1952 ...	£10,058,235	£5,353,927	£15,412,162
December, 1952 ...	£11,339,269	£4,621,038	£15,960,307
March, 1953 ...	£14,507,190	£4,066,018	£18,573,208
June, 1953 ...	£8,792,258	£4,084,716	£12,876,974
September, 1953 ...	£9,303,346	£4,833,746	£14,137,092

New Kleinfontein's Cumulative Profit Figures.—The Rand and O.F.S. monthly production return, published in our issue of October 9 last, reported that the company's cumulative profit figure from January to September, 1952, was £579,800. This figure was incorrect and should have read £282,800, which compares with the cumulative profit figure for the first nine months of the current year of £232,500.

Transvaal Consolidated Land's Extraordinary Meeting.—Transvaal Consolidated Land and Exploration, which is in the Central Mining Rand Mines Group, has announced that an extraordinary general meeting will be held in Johannesburg on November 17 to ask shareholders to agree to dispense with the need for the company to place before every annual general meeting a return specifying the contracts entered into by the company since its last general meeting, in respect of which any declaration of interest has been made by a director or manager of the company. To effect this change the company will submit a resolution as a Special Resolution dispensing with the necessity of complying with the appropriate section of the Company's Act, 1926, as amended, of the Union of South Africa, which requires the company to make this return unless waived by shareholders' consent.

Blyvoor's General Meeting Date.—Blyvooruitzicht Gold Mining Company, which is in the Central Mining-Rand Mines Group, will hold its ordinary general meeting on Tuesday, November 17, as will Consolidated Main Reef and New Modderfontein. Modderfontein East's meeting will be held on November 18, and Central Mining Free State Areas' will be held on November 20.

New Modder also announce that shareholders will be asked at their meeting to approve the reduction of the company's authorized capital from £560,000 to £490,000 by returning to shareholders 6d. per share, thus reducing the nominal value of the shares from 4s. to 3s. 6d. each.

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ALUMINIUM AND ALUMINIUM ALLOY EXTRUSIONS, TUBES AND FORGINGS

SOUTH KALGURLI CONSOLIDATED, LIMITED

The fortieth annual general meeting of the above Company was held at 1 Broad Street Place, London, E.C.2, on October 15, 1953.

Mr. T. Pryor, D.S.O., M.Inst.M.M. (Chairman of the Company) who presided, in the course of his speech said:—

The tonnage of ore sent to the mill during the year to March 31, 1953, was 107,964 s.tons, this being the highest tonnage since 1942, at which date a considerable part of the total ore crushed came from outside the Company's leases. The average grade was 5.01 dwt. per s.ton, a decrease of 0.15 dwt. from the previous year. This fact, coupled with the continuous rise in costs, brought the balance of profit on mining account down to £24,271 as against the comparative figure of £33,330 last year. The total profit, after bringing in income from investments and other sources, but before charging taxation, was £25,287, a decrease of £9,016 from the previous year's figure of £34,303.

Unfortunately, it is again necessary to refer to the burden of United Kingdom taxation, because of the manner in which it aggravates the effect of the arbitrary maintenance of the current price of gold. The taxation is not limited to a tax on the profits remitted to this country, but the profit is taxed in full, although it is earned overseas. Shareholders will doubtless be aware of the very reasonable case presented to the Chancellor of the Exchequer for alleviation of this tax burden which is borne by companies engaged in gold mining. So far, however, the concessions granted have little practical effect for a company such as ours, with the result that out of £25,287 net earnings we have to provide a total of £15,530 in taxation. In considering dividend policy, the Board had to have regard to the reduced earnings and to the necessity of providing for future capital expenditure. In consequence, the dividend payment on the profits for the year was fixed at 20 per cent.

The current assets of the Company total £87,364 which is an increase of approximately £10,000 over the previous year, mainly reflected in the cash position. At the same time, there is an increase of £6,700 in the current liabilities.

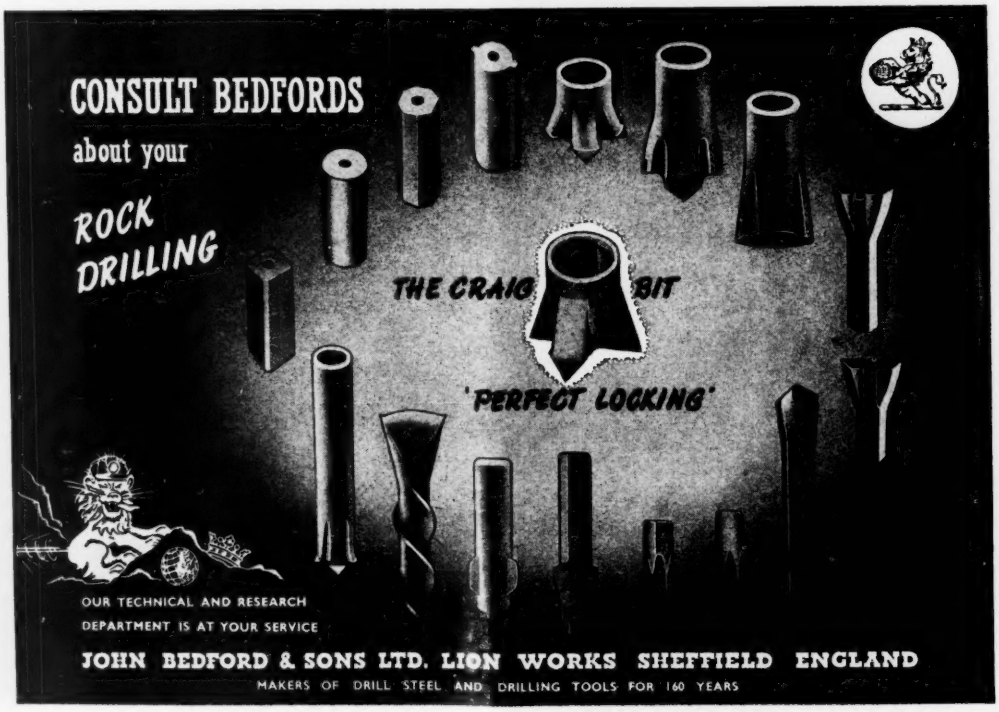
In order to bring myself up to date with the affairs of the Company, I paid a short visit to the mine in August. The inflationary tendency in Australia continues, though on a declining scale. During the year under review, the basic wage at Kalgoorlie rose by £A1 6s. 1d. per week, which is A13s. 2d. less than the increase in the previous financial year. In the six months since the end of March, 1953, there have been further increases in basic wage, amounting to A3s. 7d. per week. Everywhere in Australia I found a realization that the basic wage procedure had failed to produce the benefits expected, because wage earners were no better off, despite the fact that their pay-packets were larger.

No one can say when it may become politically possible to apply effective remedies for the present chaos caused by managed currencies throughout the world. As I said at the annual general meeting two years ago, world trade and prosperity can never regain their proper levels until gold is restored as a touchstone of currencies, and until the price of gold in the United States is placed at a realistic figure. This does not mean return to the fixed gold standard of the beginning of this century, but it does involve periodical adjustment of the price of gold dependent upon the ratio between the supply of newly mined gold and the volume of world trade. Meanwhile, the price received for our gold sold on the open market for dollars realized, on the average, an additional A16s. 11d. per oz. during the financial year under review, making a total of an additional £16,106 received in sterling for the sales of gold during the year. The latest additional price received is A9s. 8d. per oz. in September. Our working costs per s.ton, including development, have increased from A47s. 1d. in 1949 to A64s. 8d. in 1953, a rise of 37 per cent.

The principal development results for the year have been given in the extracts from the General Manager's report published with the Directors' report and accounts for the year. There is little I need add, except to say that the new discoveries of the year in the bottom levels are ore bodies which are markedly patchy in their gold content and appear to be controlled by cross-fractures.

The Croesus mill, in which we have a half share interest by reason of our holdings of shares and debentures in Croesus Proprietary Treatment Co., Ltd., treated the whole of the ore produced by this company as well as ore supplied by North Kalgurli (1912), Ltd., which company owns the other half share in the Croesus plant. During my stay in Kalgoorlie, I paid several visits to the Croesus treatment plant and I have much pleasure in testifying to the keenness and efficiency with which Mr. Field and his staff tackle every branch of their work.

The report and accounts were adopted.



KRAMAT PULAI

MR. ERNEST V. PEARCE'S STATEMENT

The forty-fifth annual general meeting of Kramat Pulai, Ltd., was held on October 12 at the registered office, 73 Cheapside, London, E.C.

Mr. Ernest V. Pearce, A.M.I.M.M., chairman of the company, presided.

The following is an extract from the statement of the Chairman, which was circulated with the report and accounts for the year ended March 31, 1953:—

After providing for taxation there remains a balance of profit for the year to March 31, 1953, of £5,670, which, with the unappropriated balance from the previous year, £32,223, makes available a credit of £37,893. Your directors recommend the payment of a dividend of 3d. per share together with a bonus of 3d. per share, both less tax.

Mr. John Weekley, our general manager, retired in December, 1952, owing to ill-health. It was with great regret that the Board accepted his resignation for he had served the company loyally and well for 25 years. I feel sure that members will join the Board in wishing him a healthy and happy retirement.

The price of scheelite declined from £1,788 in the year to March, 1952, to £1,388 per ton in the following year, and costs increased considerably. At the moment the world price is about £1,100 per ton.

A war damage award of £15,312 gross has at last been made for our tin section. Our claim was for £26,000, which included £5,150, the value of concentrate extracted by the Japanese, for which, in common with other similar claimants, we receive no compensation. After abatements common to all awards the net sum is £11,397. A separate claim for compensation to cover the damage to the scheelite section is being submitted to the War Damage Commission and we await news of the award under this heading.

NEW AREAS

Although application for a mining lease to cover the Kampong Binjai area was lodged some 15 months ago it has not yet been granted. We have received a permit to prospect the sea-bed off the coast of Malacca and prospecting operations are about to be commenced. For some years there has been a small production of tin by Chinese working along the coast, an indication of the possibility, to put it no higher, of our finding values in the sea-bed. Scout boring should soon prove if the venture is worth following up.

Tromal Prospecting, Ltd., to which I referred last year, is awaiting the granting by the Siamese Government of leases covering the areas on which payable values have been proven; meanwhile the necessary plant and equipment are under construction.

Members have been advised from time to time that it was our intention to undertake a geophysical survey of the Kramat Pulai area. After careful study, in view of the heavy expense which this would involve and the technical advice received that the survey is unlikely to be justified, it has been decided to abandon the project.

TIN PRICES

During the year covered by the accounts the prices of tin in Singapore averaged $477.8 per picul, equivalent to £944 5s. per ton compared with £955 10s. per ton in the previous year. On March 31 of this year the Singapore price was $466.6 per picul, equivalent to £921 15s. per ton. Since that date the price has fallen continuously until on August 4 it touched $281.875 per picul, equivalent to £554 18s. 9d. per ton. There has been some recovery recently and the Singapore price at the time of preparing this address is $310.810 per picul, equivalent to £609 3s. 9d. per ton. Members will appreciate the impact that the decline in the prices of scheelite and tin is bound to have on our profits.

Although all reports show that general conditions in Malaya have greatly improved, it will be realized on reading the manager's report that he has had to contend with many difficulties. Our thanks are due to him and his Asian employees for the courageous manner in which they have carried on in one of the most troubled areas in Malaya.

The report and accounts were adopted.

QUALIFIED AND EXPERIENCED MINING ENGINEER required for Portuguese India to take control of the operation of open-cast iron ore mines, also their further development and mechanization. Applications should include full particulars of qualifications and experience. also salary required. Box No. 538.

MANAGER AND ENGINEER required, the former for field work on alluvial mining in West Africa and the latter for electro-magnetic and electro-static mineral separation in the United Kingdom. Applicants should state age, experience, qualifications, and level of remuneration of interest to them. Box No. 539.

DIAMOND DRILL OPERATOR required for Gold Mine in South America. Must be well experienced in diamond core drilling on surface and underground. Knowledge of Spanish an advantage but not essential. Free passage and living quarters—2 year contract—write stating age, full details of training and experience, to Box N. 797, c/o Streets, 110 Old Broad Street, E.C.2.

ASSAYER required for gold mine in South America. Applicant should have been well trained in gold and silver assays, particularly bullion assays, and able to run wet assays on lead and zinc. Experience on general qualitative and quantitative analysis desirable. Knowledge of Spanish an advantage but not essential. Two years contract. Salary up to £90 p.m. according to experience, plus additional two months' pay per year in local currency. Free furnished quarters and passage for selected candidate and wife. Write stating age, and full details of training and experience, to Box N. 729, c/o Streets, 110 Old Broad Street, E.C.2.

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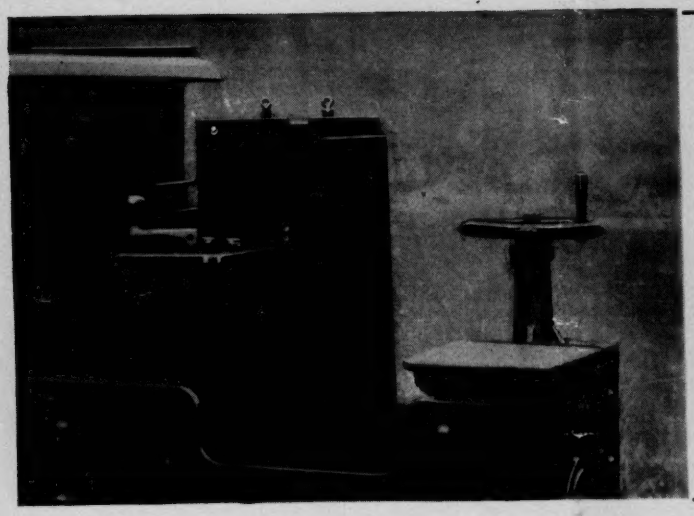
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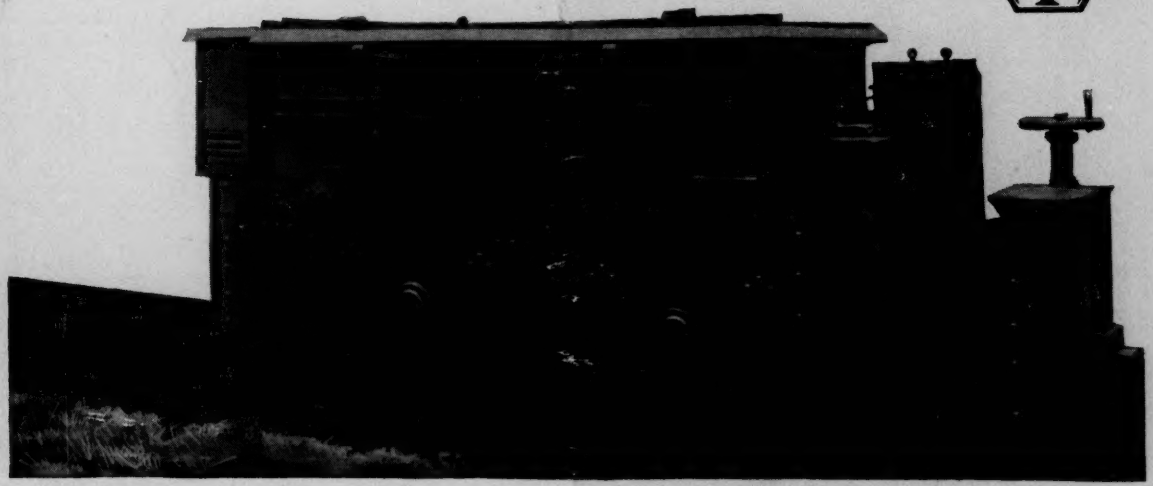


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